VOL. XXV. No. 6 JUNE 1940

MECCANO MAGAZINE

6D.

MECCANO

MECHANISED ARMY OUTFIT

PRICES OF MECHANISED ARMY OUTFIT PARTS

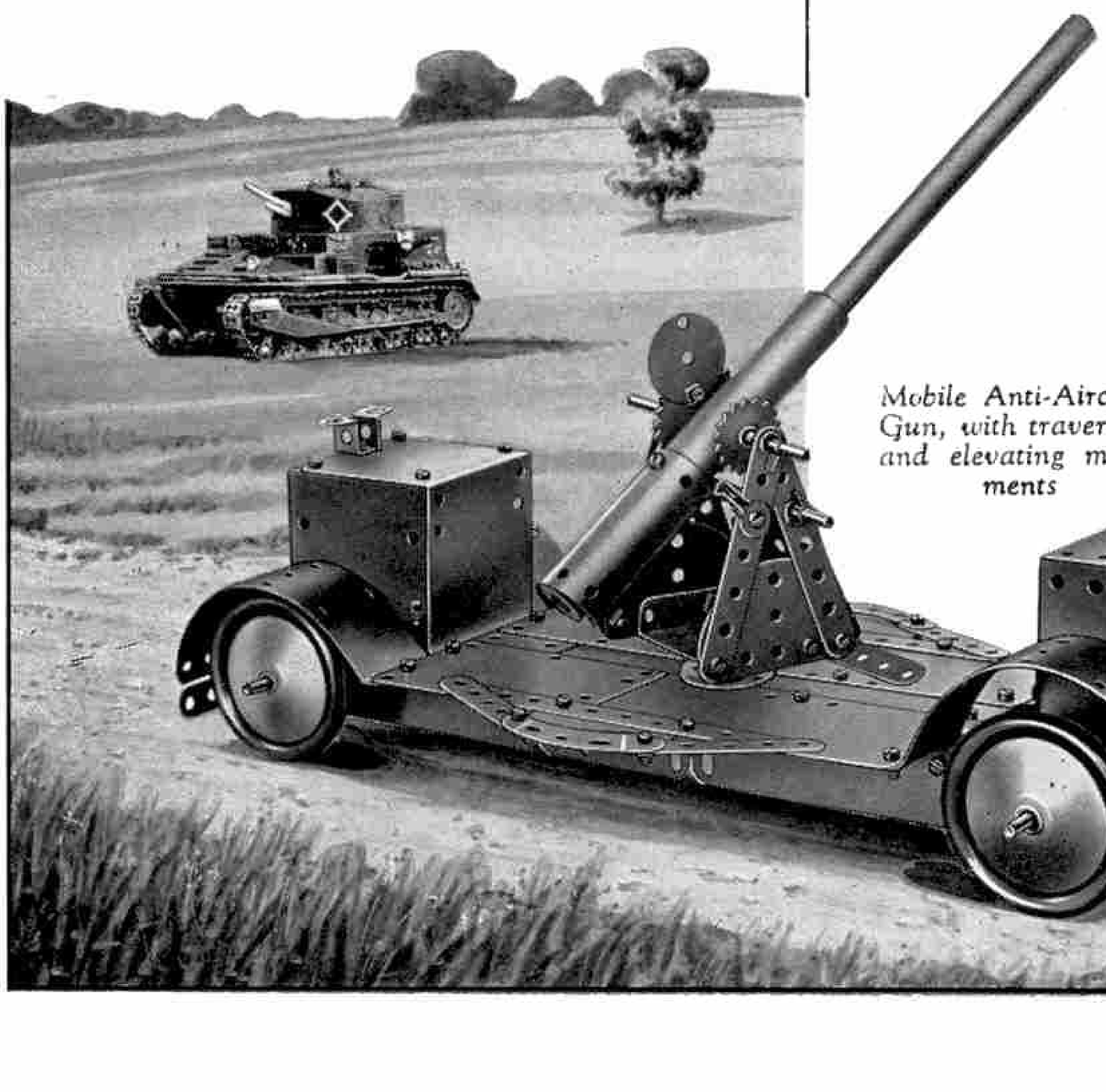
No.			
M1	12½" Perforated Strips	½ doz.	1/6
M2	5½" " "	"	9d.
M3	3½" " "	"	6d.
M5	2½" " "	"	5d.
M6a	1½" " "	"	4d.
M10	Flat Brackets	doz.	1d.
M12	Angle Brackets, ½" x ½" ...	"	3d.
M14	6½" Axle Rods	"	10d.
M15a	4½" " "	"	7d.
M16a	2½" " "	"	4½d.
M24	Bush Wheels	each	3d.
M34	Spanners	"	1d.
M35	Spring Clips	box (20)	2d.
M36	Screwdrivers	each	3d.
M37	Nuts and Bolts, 7/32" ...	box (12)	2d.
M38	Washers	pkt. (20)	1d.
M48a	Double Angle Strips, 2½" x ½" ...	½ doz.	8d.
M51	Perforated Flanged Plate, 2½" x 1½"	each	3d.
M52	" " " 5½" x 2½"	"	5d.
M90a	2½" Curved Strips, Cranked, 1⅝" radius, 4 to circle	"	1d.
M94	Sprocket Chain, 40" length ...	"	6d.
M95a	" Wheels, 28 teeth, 1½" dia.	"	4½d.
M96	" " 18 " 1" "	"	3½d.
M103	Flat Girders, 5½"	½ doz.	1/3
M103l	" " 2½"	"	8d.
M111	Bolts, ⅜" long	doz.	3d.
M111c	" ⅜" "	"	1½d.
M111d	" 1½" "	"	6d.
M125	Reversed Angle Brackets, ½" ...	½ doz.	3½d.
M126	Trunnions	each	1½d.
M187	Road Wheels	"	5d.
M188	Flexible Plates, 2½" x 1½"	doz.	9d.
M189	" " 5½" x 1½"	"	1/3
M190	" " 2½" x 2½"	"	1/-
M190a	" " 3½" x 2½"	"	1/6
M192	" " 5½" x 2½"	"	2/-
M200	Curved Plates, 1 11/16" radius ...	each	1½d.
M212	Rod—Strip Connectors	"	1d.
M214	Semi-Circular Plates, 2½"	"	2d.
M217a	Discs, 1½"	doz.	9d.
M219	Wheel Discs	each	1½d.
M220a	Gun Barrel, Large	"	3d.
M220b	" " Medium	"	2d.
M220c	" " Small	"	1d.
	Manual of Instructions	"	3d.

Every boy is interested in the mechanised units of the British Army, and will welcome this fine Mechanised Army Outfit, which makes possible the building of models of a variety of Army prototypes.

The Outfit consists of a big assortment of specially designed Meccano Parts, including gun barrels, with which realistic models of Tanks, Anti-Aircraft Guns, Field Guns, Transport Lorries, etc., can be built. The parts are finished in the correct shade of Service green.

The model shown below is taken from the illustrated Manual of Instructions included in the Outfit.

Price **13/6**



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L9F. Frosted **1/1½.**
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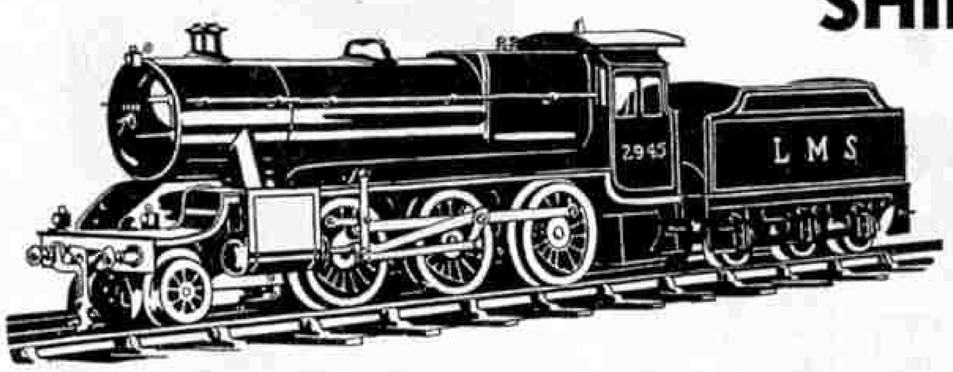

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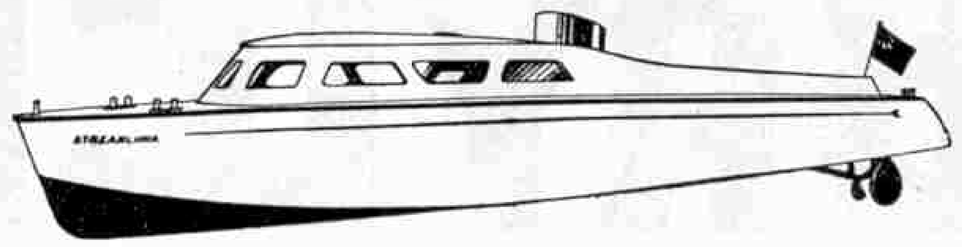

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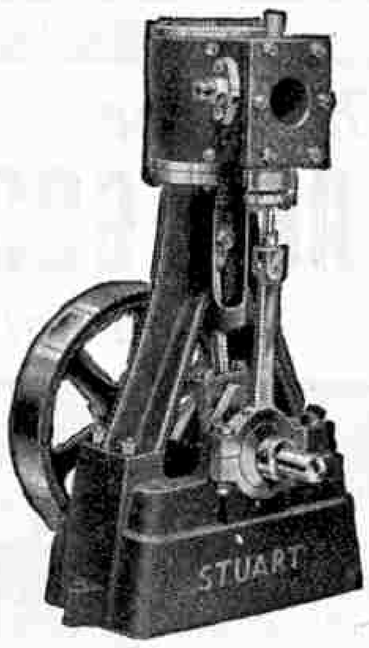

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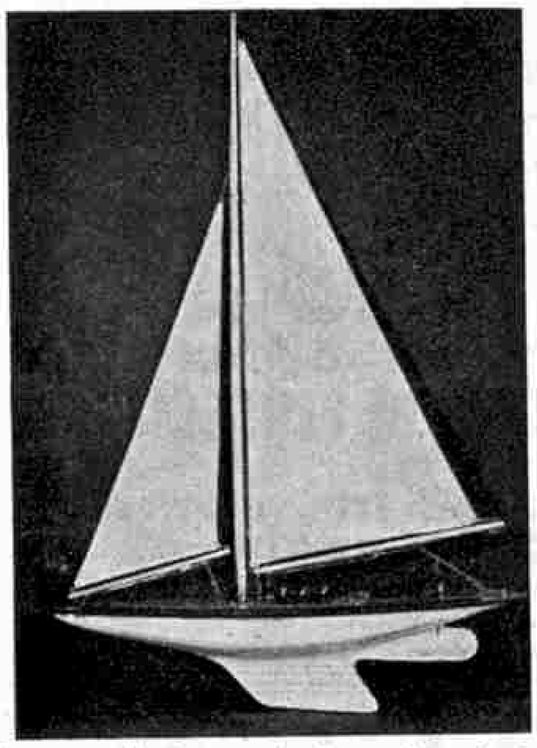
THE ADVERTISEMENT MANAGER,
MECCANO MAGAZINE, BINNS ROAD, LIVERPOOL 13

"Endeavour" Yachts



These new Yachts are the latest thing for fast racing work. All of the hulls are hand made in best yellow pine. Cabin skylight extra.

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Carriage extra.

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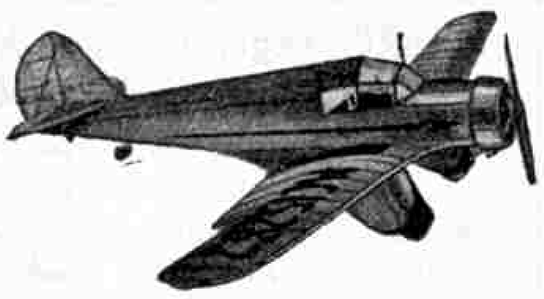

Kits for 12-in. wing span Flying Models of the AERONCA, BOEING P12E, CURTISS PURSUIT, HELL DIVER, LOCKHEED VEGA, MONOCOUPE, PUSS MOTH, STINSON RELIANT, TAYLOR CUB, VULTEE VIA, WACO, CURTISS FALCON, SPAD, SOPWITH CAMEL, NIEUPORT, GULF HAWK, HORNET MOTH, MILES MAGISTER.
Price 11d. Postage 3d.

Kits for 24-in. wing span Flying Models of the STINSON RELIANT, WACO CUSTOM, MONOCOUPE, CONSOLIDATED P/30, FAIRCHILD, HAWKER FIGHTER, CURTISS HAWK, RICHMAN and MERRILL'S VULTEE. Price 2/6.
Postage 4d.

Send 8½d. for Bond's 1940 Catalogue. Its 208 pages illustrate all types of Models, Tools, and Materials.

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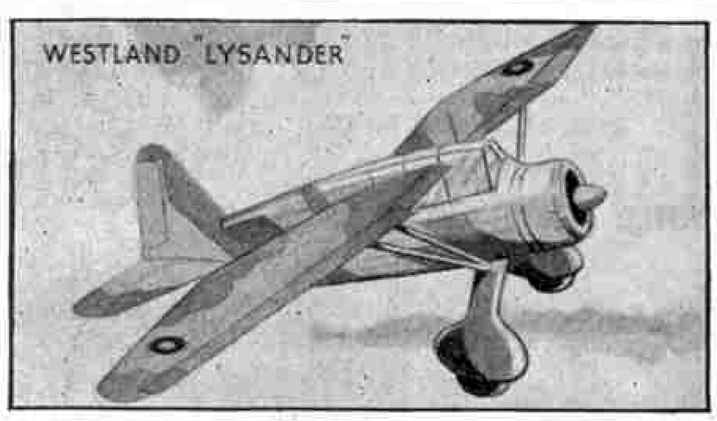
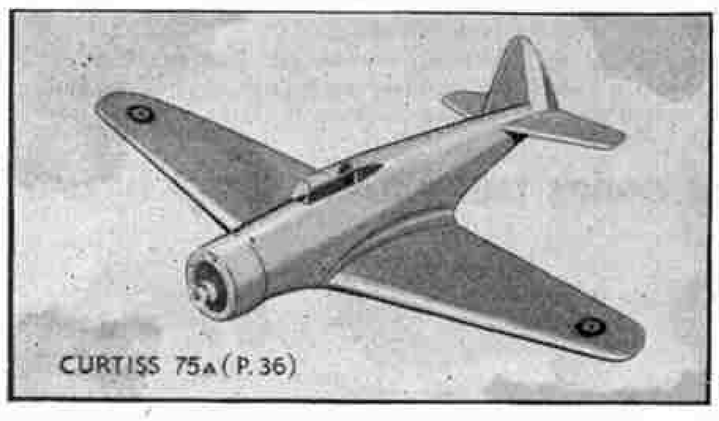
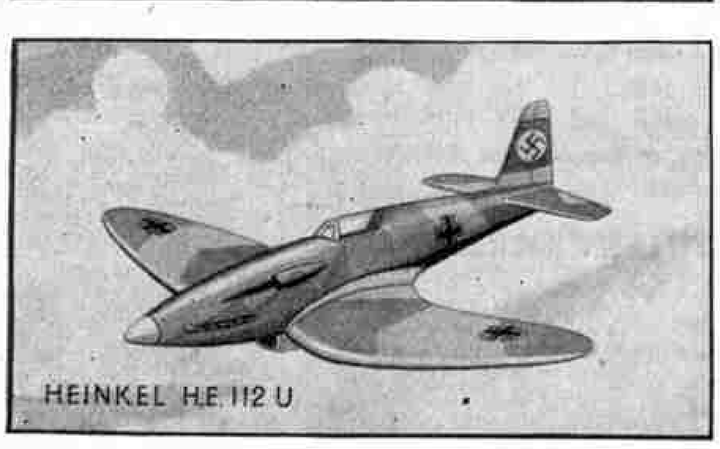


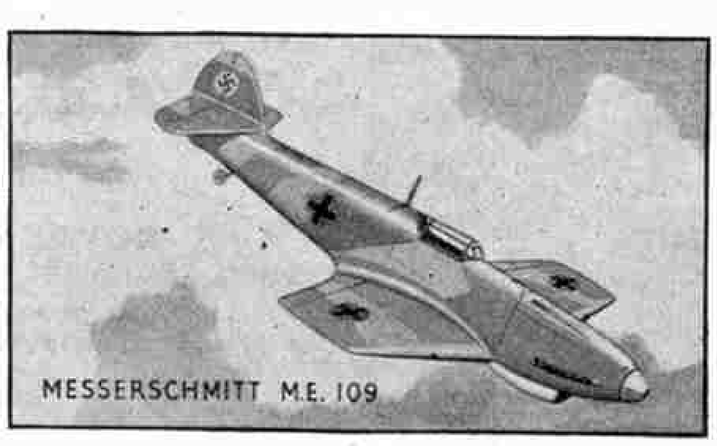


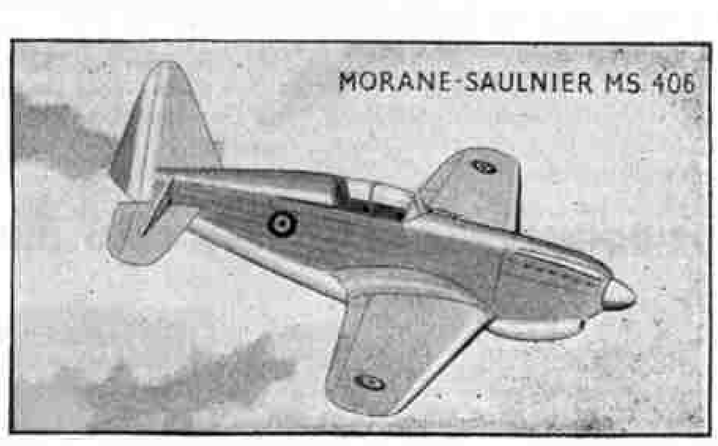
The construction of flying scale models presents a difficulty not encountered in the building of other types of model aircraft — the retention of faithful reproduction without the loss of flying qualities. The designer does much to overcome this problem, but the final results must necessarily depend upon the builder. FROG kits minimise the risk of disappointment by the inclusion of step-by-step instructions and flying hints that put the novice on a par with the expert. All the parts are clearly printed on best quality balsa, tycoon tissue for covering and a supply of quick-drying cement are included. Blanks are supplied for both scale and flying airscrews, while engine cowls, airscrew spinners, moulded wheels, elastic motors, correct insignia and full-scale working drawings make the kits absolutely complete. Ask to see them at your local toyshop or store.

COMPLETE KIT
5/6

FROG SENIOR SERIES







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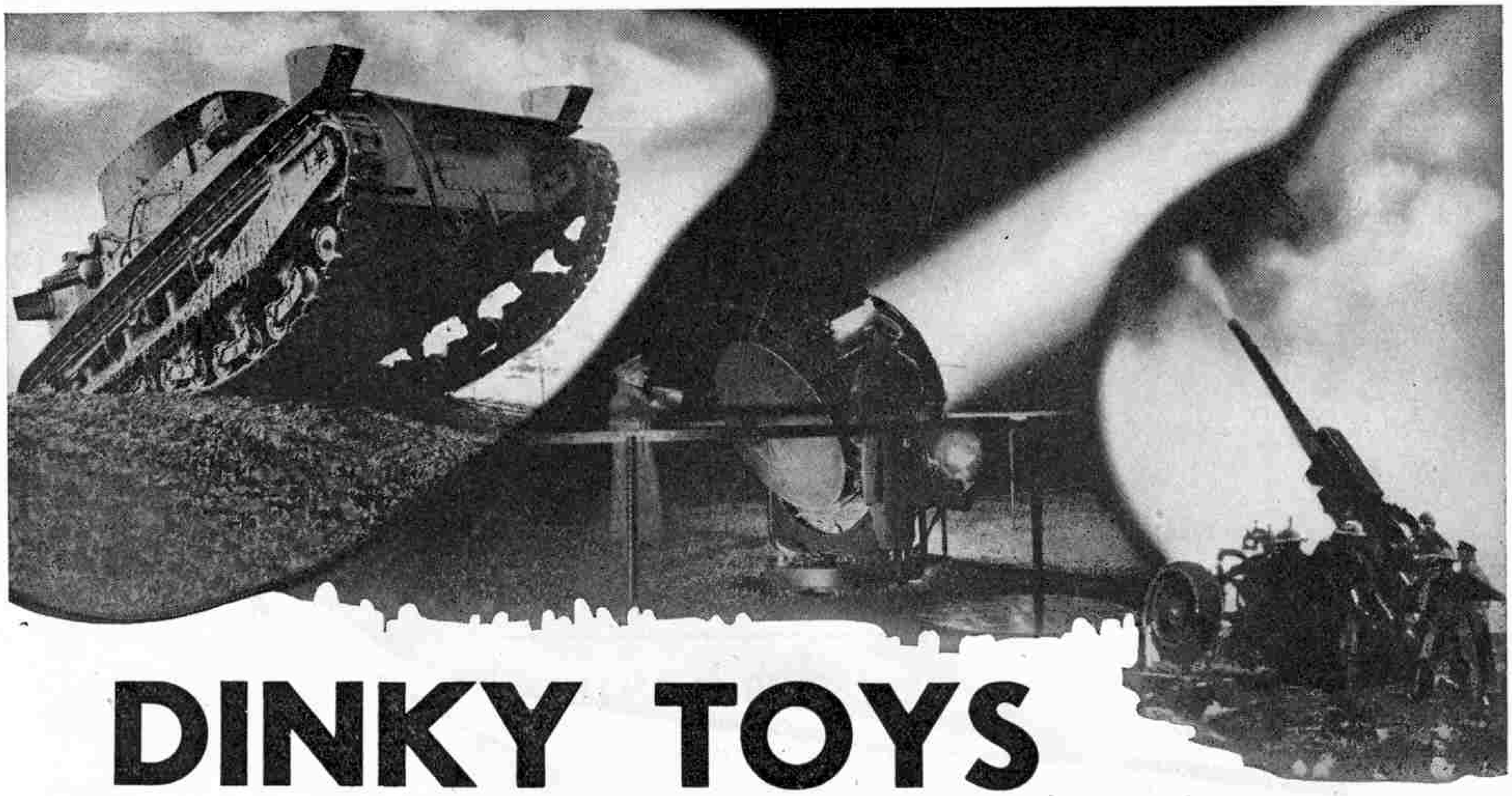
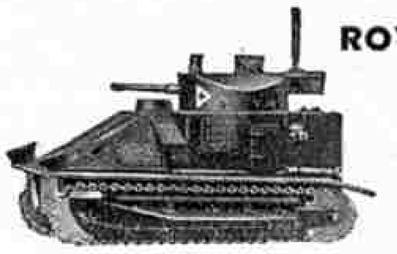


DINKY TOYS

Among the most popular Dinky Toys models are the Mechanised Units of the British Army. They include two Royal Tank Corps Sets, an accurately modelled Mobile Anti-Aircraft Unit, an 18-pounder Quick-Firing Field Gun Unit and Royal Artillery and Royal Tank Corps Personnel.

ROYAL TANK CORPS MEDIUM TANK SET



151a

151d

150d

151c

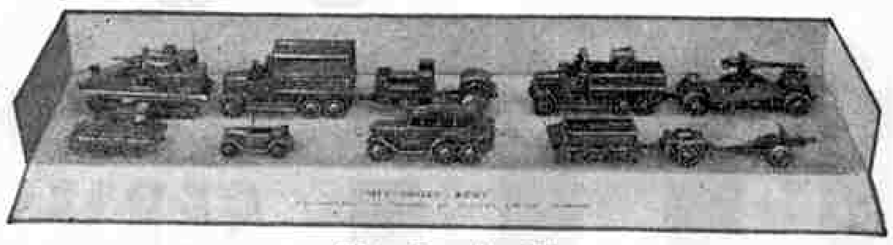
151b

Dinky Toys No. 151

No. 151a	Medium Tank	each	**1′9**
No. 151b	Transport Wagon ...	„	**1′2**
No. 151c	Cooker Trailer	„	**7d.**
No. 151d	Water Tank Trailer ...	„	**5d.**
No. 150d	Driver	„	**2d.**

Price of complete set **4′-**

MECHANISED ARMY



Dinky Toys No. 156

This fine set contains the principal units of a modern mechanised army. It includes the following items:
Royal Tank Corps Medium Tank Set (Dinky Toys No. 151) without driver.
Royal Tank Corps Light Tank Set (Dinky Toys No. 152) without driver.
Mobile Anti-Aircraft Unit (Dinky Toys No. 161).
18-Pounder Quick-Firing Field Gun Unit (Dinky Toys No. 162).

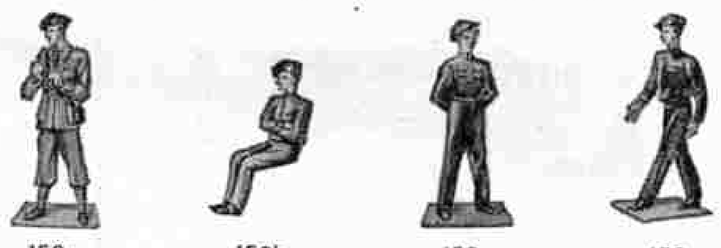
Price **12′6**

18-POUNDER QUICK-FIRING FIELD GUN UNIT

Dinky Toys No. 162

Comprises scale models of an 18-pounder Quick-Firing Field Gun, Trailer and "Light Dragon" Motor Tractor. Price **2′6** per set

ROYAL TANK CORPS PERSONNEL



150a 150b 150c 150e

Dinky Toys No. 150

No. 150a	Officer	each	**2½d.**
No. 150b	Private, sitting (two in set)	„	**2d.**
No. 150c	Private, standing (two in set)	„	**2d.**
No. 150e	N.C.O.	„	**2d.**

Price of complete set **1′-**

MOBILE ANTI-AIRCRAFT UNIT

Dinky Toys No. 161

Comprises scale models of a Quick-Firing Anti-Aircraft Gun mounted on a mobile platform and a Searchlight mounted on a lorry. Both Gun and Searchlight have elevating and traversing movements. Price **3′6** per set

ROYAL TANK CORPS LIGHT TANK SET

152a 150d 152b 152c

Dinky Toys No. 152

No. 152a	Light Tank ...	each **1′2**	No. 152c	Austin Seven Car	each **5d.**
No. 152b	Reconnaissance Car	„ **1′2**	No. 150d	Driver ...	„ **2d.**

Price of complete set **2′11**

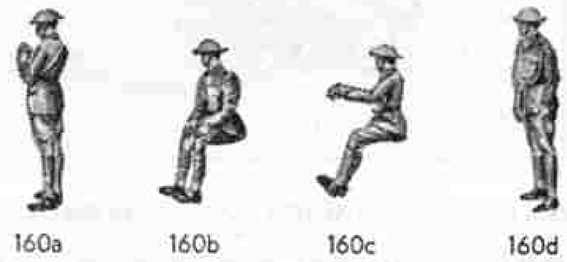
ROYAL ARTILLERY PERSONNEL

Dinky Toys No. 160

For use with Dinky Toys No. 161, Mobile Anti-Aircraft Unit and No. 162, 18-pounder Quick-Firing Field Gun Unit.

No. 160a	N.C.O.	each	**2½d.**
No. 160b	Gunner, sitting (two in set)	„	**2d.**
No. 160c	Gunlayer	„	**2d.**
No. 160d	Gunner, standing (two in set)	„	**2d.**

Price of complete set **1′-**



160a 160b 160c 160d

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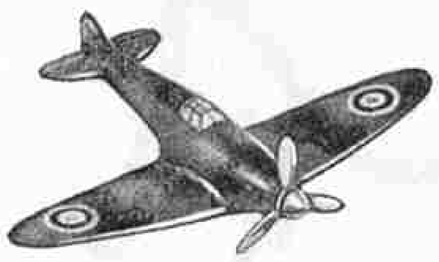
DINKY TOYS

OVER 300 VARIETIES

The Dinky Toys aeroplanes owe their popularity to their scale proportions, wealth of detail and attractive finish.

Here is a selection from the extensive range

VICKERS-SUPERMARINE "SPITFIRE" FIGHTER (Camouflaged)

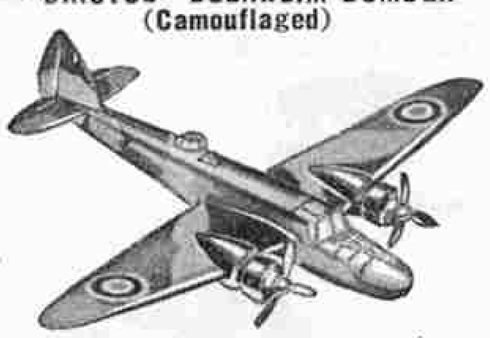


Dinky Toys No. 62e

Scale model of the Vickers-Supermarine "Spitfire," one of the fastest fighter aircraft used by the Royal Air Force.

No. 62e Camouflaged ... **6d.** each
No. 62a Aluminium Finish ... **6d.** each

"BRISTOL" BLENHEIM BOMBER (Camouflaged)



Dinky Toys No. 62d

Realistic model of the latest "Bristol" Blenheim Bomber extensively used by the Royal Air Force.

No. 62d Camouflaged ... **9d.** each
No. 62b Aluminium Finish ... **9d.** each

AIRSPEED "ENVOY" MONOPLANE

Dinky Toys No. 62m

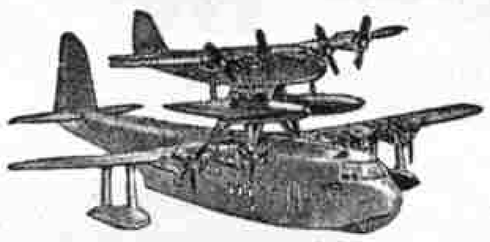
Scale model of the Airspeed "Envoy" twin-engined commercial monoplane. Assorted colours. Price **8d.** each

BOEING "FLYING FORTRESS"

Dinky Toys No. 62g

Scale model of Boeing B-17 "Flying Fortress," one of the fastest bombers in the world, and extensively used by the United States Army Air Corps. Price **1/2** each

MAYO COMPOSITE AIRCRAFT



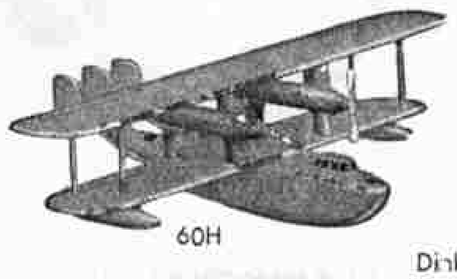
Dinky Toys No. 63

Scale model of the Mayo Composite Aircraft. Price **2/6** each

The components of the above can be purchased separately.

No. 63a Flying Boat "*Maia*" ... each **1/6**
No. 63b Seaplane "*Mercury*" ... „ **1/-**

R.A.F. AEROPLANES



60H

60N

60P

Dinky Toys No. 61

This interesting Set contains miniatures of three contrasting types of R.A.F. aircraft.

No. 60h "Singapore" Flying Boat ... ... each **1/-**
No. 60n Fairey "Battle" Bomber (2) ... ... „ **6d.**
No. 60p Gloster "Gladiator" Biplane (2) ... ... „ **7d.**

Price of complete set **3/-**

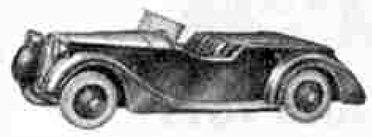
NEW THIS MONTH!

FRAZER-NASH—B.M.W. SPORTS CAR

Dinky Toys No. 38a

A realistic scale model of a famous car that has won many successes in motor sports.
Fitted with detachable rubber tyres.
Price **1/3** each

SUNBEAM-TALBOT SPORTS CAR



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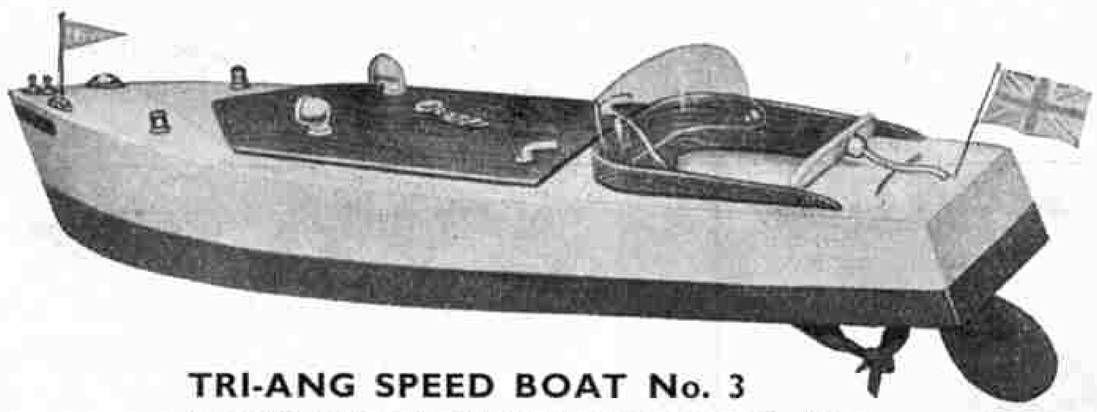

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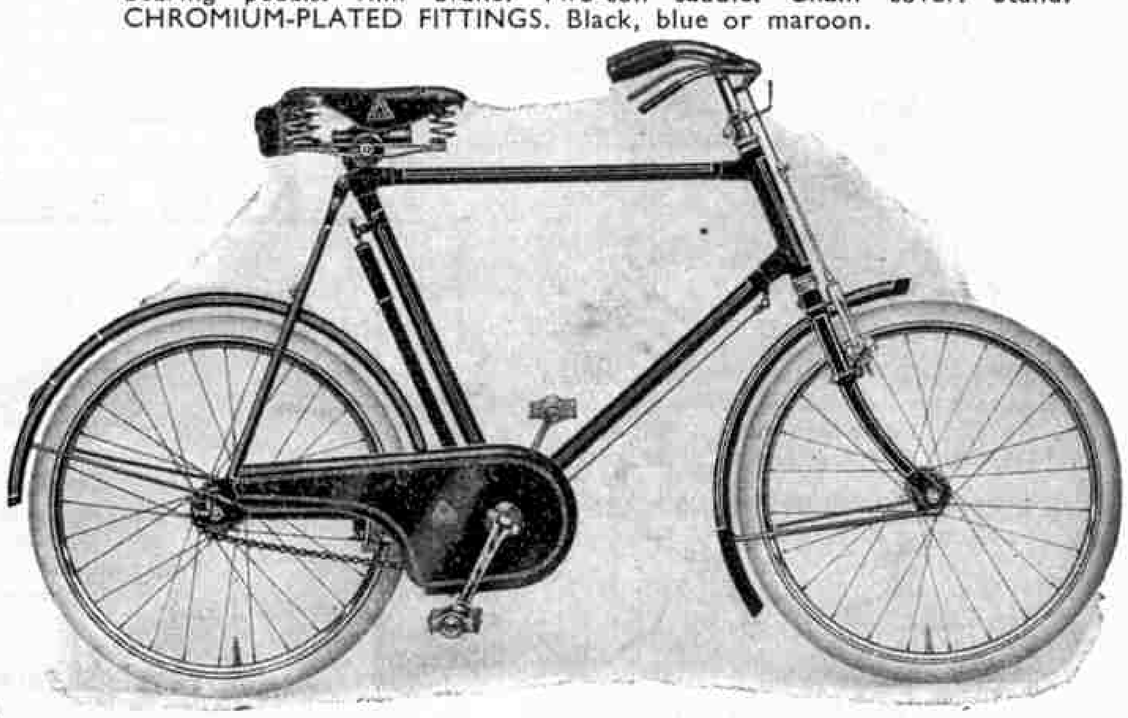

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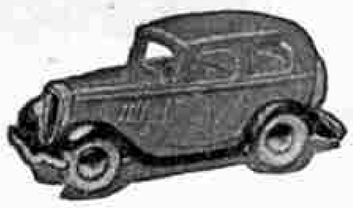

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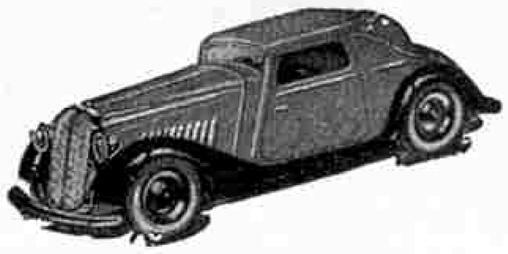

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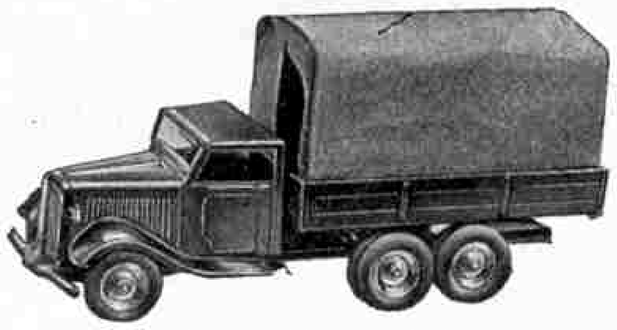

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With the Editor

A War of Machines

I have heard people say that war would become so terrible that no country would dare to embark on it. The dreadful struggle that is being waged as I write shows that we are far from reaching such a state of affairs. This battle is first of all a gigantic clash of machines designed to destroy life and material, and it is a dreadful thought that so much mental effort should have been concentrated on mechanisms for mass murder. Our engineers must not be blamed, however. They would all infinitely prefer to use their skill in making the world happier and more prosperous. But when an unscrupulous blackguard like Hitler drives the whole engineering resources of his country to produce in ever-increasing quantities war machines of every kind, with the clear object of invading his neighbours, other nations who wish to survive must call upon their own engineering resources for war efforts in defence.

We have heard much of the "surprise" weapons that Hitler had in store for us; but where are they? The magnetic mine certainly came as a surprise, although it was not really a new device; but already it has been mastered. The only other surprise has been the heavily armoured 80-ton tanks used recently by the Germans in France and Flanders, and for these monsters the famous French "75s" are proving a match. In my opinion we have nothing to fear from "surprise" weapons; the engineers of Britain and France can more than hold their own against those of Hitler.

The aim of the Allies is to restore peace, and to make the world safe for all nations, large and small. To do this it will be necessary not only to overthrow Hitler and his gang, but also to crush the war spirit that the Nazis have developed among the younger generation of the German people.

Air Chief Marshal Sir Edgar R. Ludlow-Hewitt, K.C.B., C.M.G., D.S.O., M.C., Inspector-General of the Royal Air Force.

Leaders in the War

IX. Sir Edgar Ludlow-Hewitt

Air Chief Marshal Sir Edgar R. Ludlow-Hewitt was born in 1886 and educated at Radley, and after passing through Sandhurst he joined the Royal Irish Rifles in 1905. When war broke out in 1914 he transferred to the Royal Flying Corps, qualified as a pilot and went to France with No. 1 Squadron, which arrived in time to take part in the battle of Neuve Chapelle in March 1915. In this battle Capt. Ludlow-Hewitt made a direct hit with a 100 lb. bomb on the railway station at Wavrin. During the war he was mentioned in dispatches six times, and was awarded the D.S.O., the Military Cross, and the Companionship of the Order of Saint Michael and Saint George.

In 1918-19 Sir Edgar was Chief Staff Officer at the Royal Air Force headquarters in France, and from 1926-30 was Commandant of the R.A.F. Staff College, in England. A short period of foreign service followed when he was made Air Officer Commanding, Iraq Command, in 1930, and he returned home in 1933 to take up the post of Director of Operations and Intelligence, Air Ministry. Two years later he was appointed Air Officer Commanding, R.A.F. in India.

In 1937 Sir Edgar returned home to become Air Officer Commanding, Bomber Command. In this important post he was responsible for dealing with the many complicated problems that grew out of the rapid R.A.F. expansion and the introduction of new types of bomber aircraft. An outstanding feat of the Bomber Command while under his leadership was the successful raid on the island of Sylt on the night of 19th March last. He had the reputation of never sending a bombing crew on a mission that he himself would hesitate to undertake. In April this year Sir Edgar was appointed Inspector-General of the Royal Air Force.

The Spider on War Work

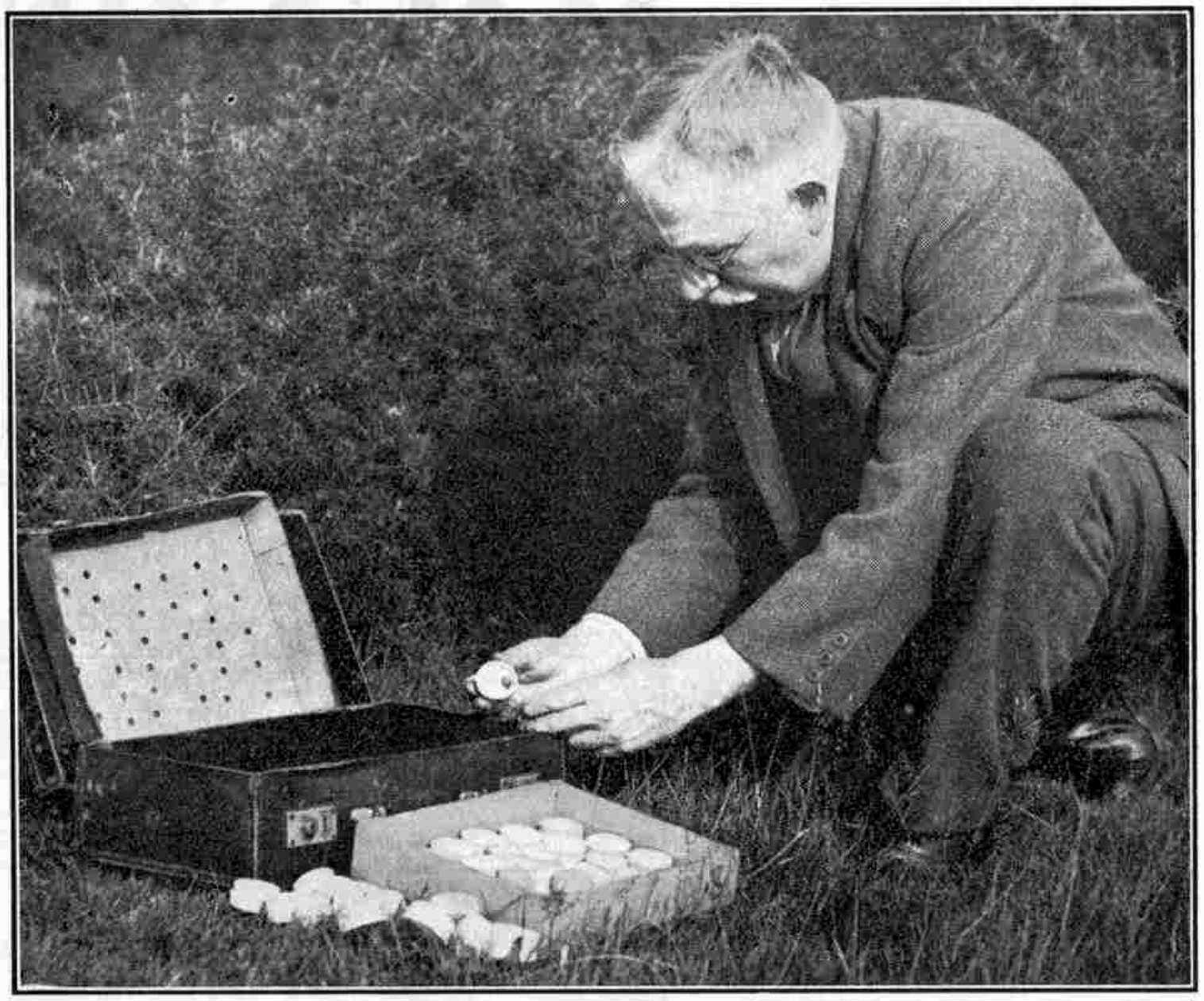
Spinning Threads for Precision Instruments

By Sydney Moorhouse, F.R.G.S.

WARTIME brings forth many strange things. Many people were surprised when it was announced that the Nazi Government had commandeered elephants, zebras and other exotic animals from German Zoological Gardens for work on the land. They must have been even more surprised when the British Ministry of Information told the world that spiders were being employed on war work in an ordnance factory at Clerkenwell.

The spider's gossamer has long been used in the making of the diaphragms of telescopes, binoculars and levelling instruments. They are employed also in microscopes used in delicate measuring instruments, and for many years Cooke, Troughton and Simms Ltd., York, have used the silken threads of the spider's web in the making of their well-known surveying and astronomical instruments.

Not every spider weaves a thread that is suited for use in such highly delicate work, and the variety used is that known to naturalists as *Epeira Drademeta*. When spiders are needed for web-weaving, a collector is sent to one of the places where this particular kind is found, and he peers into bushes and shrubs for recently spun webs, which tell him that his quarry is at hand. The spiders are found on stretches of common where gorse bushes are plentiful, and as many as 80 to 100 constitute a good day's catch. The spiders are found resting in the centre of their web, face downward, and are easily distinguished by the clear white cross on their backs.

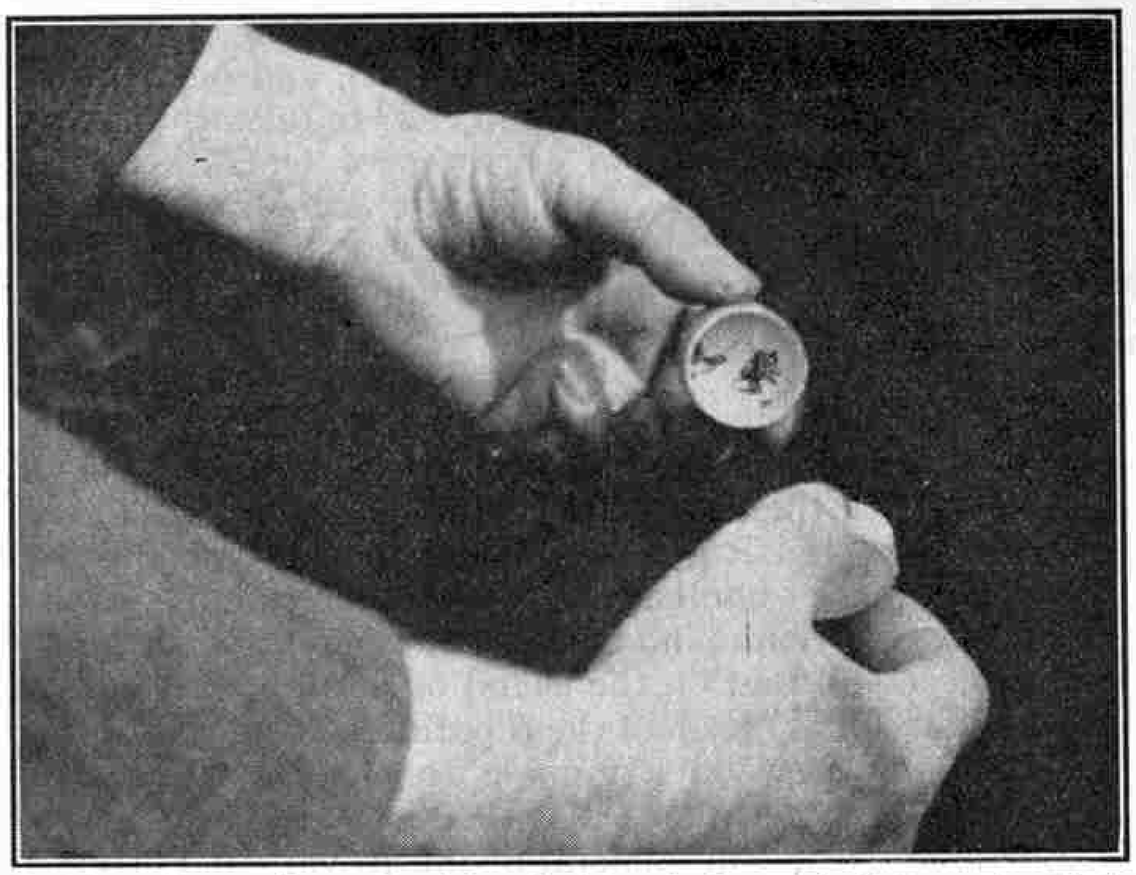


A day's bag of spiders. They are found on stretches of common where gorse bushes are plentiful, and as many as 80 to 100 constitute a good day's catch. Photographs by J. C. S. Hustwick, York.

Strensall Common, north of York, is one of the places most favoured by *Epeira Drademeta*, but I have seen it in some of the parks of Manchester. Some of the spiders remake their webs almost every evening, but the majority wait until these are almost blown into shreds before renewing them.

The spider catcher is equipped with a collection of small boxes, about the same size as pill boxes, in which to place his specimens. Only the females are required, and these can be distinguished from the males because of their larger size and also because they are much less timid. Each captive has to be given a box to itself. If two were placed together a terrific fight would ensue, for spiders are used to being mistresses in their own domain and resent any intrusion into their web-territory. The bottom half of a box is placed behind, and as close to the spider as possible, the lid of the box being held in the other hand. The spider is then gently urged into the box and the lid is quickly slipped on top. Care must be taken not to touch the web, because at the slightest touch the spider immediately takes alarm and drops into the undergrowth.

In order to obtain the web, the spider is placed on a stick held in the



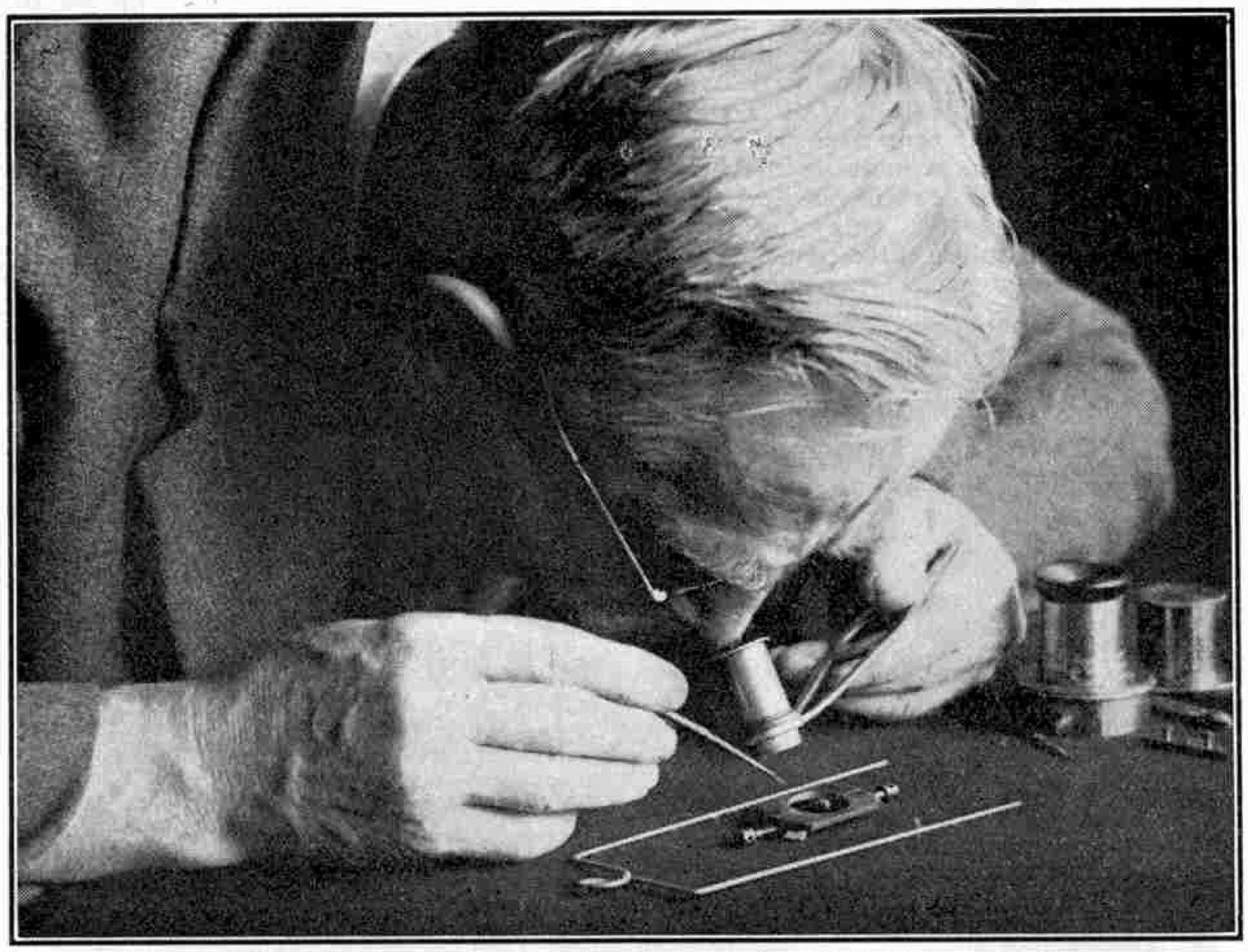
Catching spiders to be employed in spinning webs for use in instrument making. The spider is gently urged into a pill box and the lid is quickly slipped on top.

hand about three feet from the ground. This is gently shaken and the spider then commences to spin. A fork, or wire frame, the two prongs of which are moistened with varnish, is used to secure the web, and as the spider spins in its effort to reach the ground the web is wound carefully on to the fork. Each fork takes about four feet of web, and a very good spider will spin sufficient for 10 forks. This is a job that requires a great deal of skill, and much practice is necessary before one is able to do it without mishap. If you doubt this, capture an ordinary garden spider, let it mount a pencil, and endeavour to wind the silken thread it leaves behind as it falls to the ground.

It has been found that a single spider is capable of weaving sufficient thread to cover 20 frames, and that means that she has woven a length of nearly 100 yards. The forks are next stored in airtight tins until the thread is required.

As has already been said, the threads are used for the diaphragm sight-lines of telescopes and other instruments of that nature, and the filament is gummed down with shellac under the eye-piece so that the object glass can be focussed upon

Taking the web from the spider. The fork on which the web is wound takes about 4 ft. of thread.



Placing the spider's thread in position. It is secured with a tiny drop of diluted varnish.

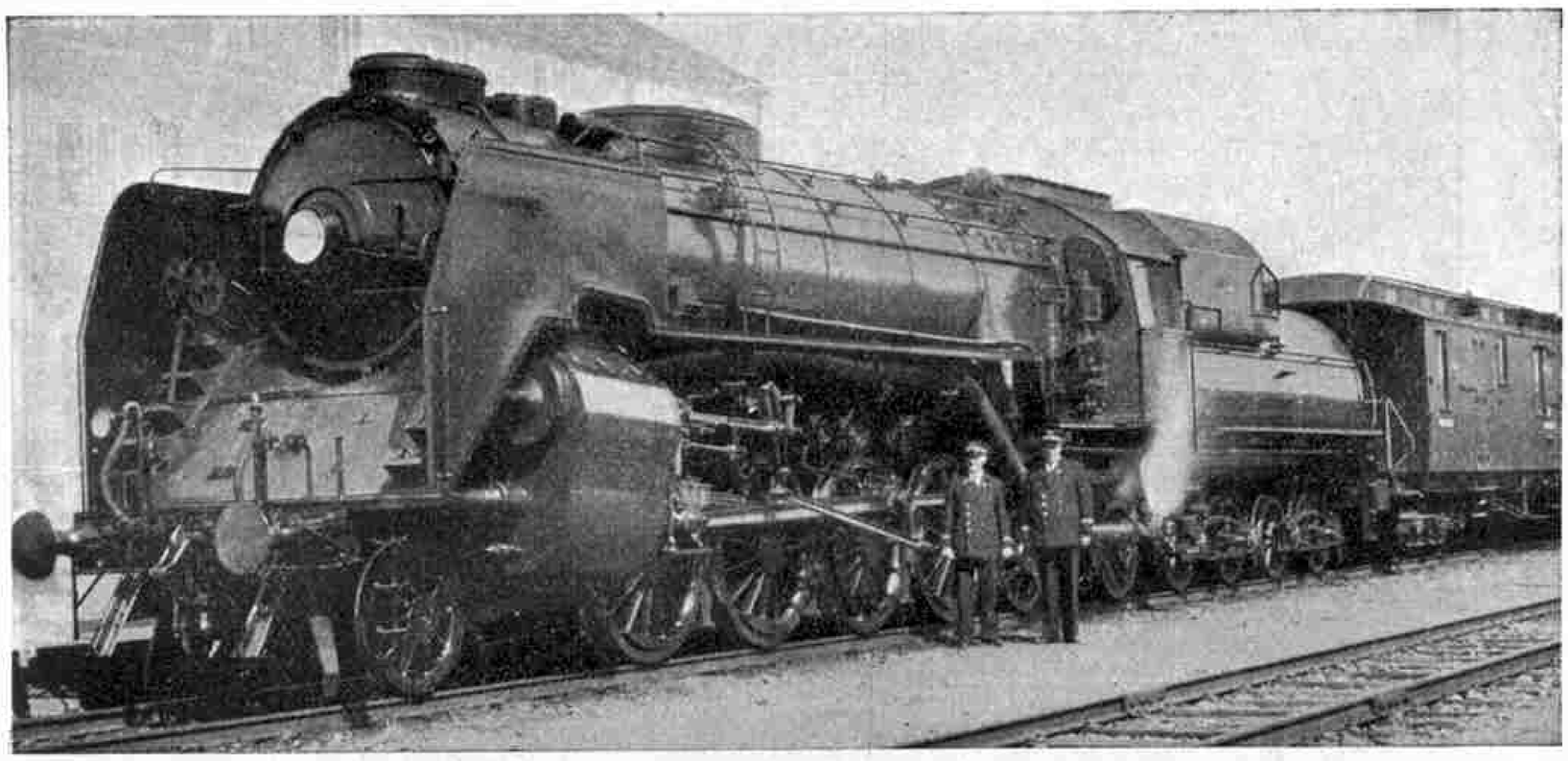
it. These lengths of filament are then seen stretched across the field of view of the instrument, and accurate sighting can be carried out on them, or on points at which they cross.

Although the thread of a spider's web is only about .0003 of an inch thick, it is sometimes found that such a width is too great for use when instruments of extreme precision are being made. The thread then has to be cut into two, or even six threads. This is done by means of an exceptionally fine-pointed needle, which is drawn through the filament. If necessary threads can be placed .005 of an inch apart, and of course for this a very fine split web is used.

Some years ago it was decided to experiment with fine steel hairs in place of spiders' gossamer, but it was found that these magnified as the power increased. Other substances were also tried, but cold, heat and damp all produced changes in thickness, whereas the spider's thread remained constant always.

While the use of spider's filament for scientific purposes is a comparatively modern innovation, all down the ages man has had a suspicion that it could be made to serve utilitarian purposes, and the belief that the spider could be used for curative purposes lingered until less than a couple of centuries ago. In 1756 one Eleazar Albin published a book entitled *"A Natural History of Spiders and Other Curious Insects,"* in which he asserted that he had cured children of agues by hanging a large spider confined alive in a box about their necks.

Dr. Watson, a contemporary of Albin, in his *"Lectures on the Principles and Practise of Physic,"* also favoured the use of the spider as a cure for ague, and refers to "keeping a spider suspended from the patient's neck in a nutshell till it dies." Many people still believe that the spider's web makes a useful styptic for bleeding.



One of the remarkable Dovregubben 2-8-4 Compound locomotives of the Norwegian State Railways. The illustrations to this article are by courtesy of "The Railway Magazine."

Railway Working in Scandinavia

By a Railway Engineer

IN such an extraordinarily difficult country as Norway transport must play a vital part in any campaign; but while many people from Great Britain go to Norway for holidays every year, their visits are mostly confined to sails up one or other of the long fjords, many of which are now household words through the stirring exploits of the Royal Navy. In consequence little is known of the railways. So, at the Editor's request, I have prepared this article, adding at the same time some notes on the railways of Denmark and Sweden which, though closely linked with those of Norway, have marked characteristics of their own.

Most English people go to Denmark by way of Harwich, and the night steamer lands them at Esbjerg, on the coast of Jutland. To reach Copenhagen from this port the train crosses the Jutland peninsula from west to east, crosses the strait called the Little Belt, and is then travelling on the island of Fünen. A much wider strait lies ahead, the Great Belt, and across this 16-mile stretch of water train ferries ply. Finally one comes to Zealand, the largest of the islands in the Danish archipelago, and Copenhagen lies on the extreme eastern point, just opposite to Malmö, in Sweden. Except on the mainland of Jutland, Danish railway travel is thus a succession of runs over comparatively small islands, interspersed with the crossing of wide waterways; and much of Danish railway enterprise in the last few years has been directed towards the elimination of the inconvenience of transferring trains to and from the various ferries.

The first of these projects to be completed was the magnificent five-span girder bridge over the Little Belt, having a length of 3,865 ft. The bridge is a combined road and rail affair, thus improving highway connections as well. This superseding of the train ferries between Jutland and Fünen in 1935 enabled a big speed-up of railway traffic to be made; it was assisted by the introduction of the now-famous "Lightning" train, three-car Diesel units, making many start-to-stop runs at speeds of 60 m.p.h. or slightly under, and running up to 80 m.p.h. at times. Over the Little Belt bridge comes in normal times a Danish portion of the famous "Nord Express," with a through sleeping-car from Paris to Copenhagen; indeed, by means of the various train ferries Denmark used to enjoy a remarkably comprehensive series of through services from the countries near at hand, such as Copenhagen–Oslo, via the Gothenburg ferry, and Copenhagen–Stockholm.

It was, ironically enough, to improve communication between Denmark and Germany that the greatest of all Danish bridges was built, the Storström. It is over two miles long, and is built on the principle of alternating cantilever and suspended spans, the latter being of ordinary plate girders. There are three central spans made specially large to allow big ships to pass underneath. This great bridge lies on the direct route between Copenhagen and Berlin.

Apart from the time spent in crossing the various ferries, railway working in Denmark is not unduly difficult; much of the Jutland peninsula is very flat, and when crossing the islands on the way to Copenhagen the pleasant rolling country seen from the carriage window is reminiscent of the South of England. No such description could be applied to the Norwegian scene, however, for here is country the ruggedness of which has to be seen to be believed. For many years it was considered impossible to construct a railway to link up Bergen with Oslo, so tremendous were the mountain ranges lying between. Yet apart from the fairly populous region grouped round Oslo Fjord, the only appreciable centres of population were to be found at the ports along the deeply indented coastline. It was not until the year 1854 that Norway had a railway at all, and then the services of no less distinguished an engineer than Robert Stephenson were called upon, and he personally supervised the building of the first short line out of Oslo.

The construction of the through main line from Oslo to Bergen was an epic, fit indeed to rank with the driving of the Canadian Pacific through the Rockies. Beyond the fjord region inland from Bergen no light-hearted decision was called for in choosing the best route up through the mountains, and the preliminary investigations alone, as to snow fall, wind pressure, and operation difficulties, went on for 10 years and cost £50,000. Although this investigation ended in 1884, it was not until 10 years later that a decision was finally made and construction began, and the line was not opened for traffic until December 1907. It is a great tribute to the skill of the engineers that through such exceptional mountain ranges no steeper gradient than 1 in 46 is to be found. It is still more

A striking winter scene on the Oslo-Bergen line, near Finse. The train is fitted with a snow plough.

remarkable that, in a country so abounding in potential sources of water power, this main line is worked exclusively by steam locomotives. After the mountain climbing is done there are still immense operating difficulties to contend with in the winter, for the inland section of the line is carried across a high plateau where snowstorms rage, and many miles of the line are completely encased in snow sheds on this account.

At the intermediate depot of Finse, which for many months lies in a positively Arctic waste of snow, are kept the giant rotary snow ploughs. The line is patrolled incessantly during the winter, and every locomotive in ordinary service carries a hefty wedge-shaped plough fixed to the buffer beam.

As might well be imagined, there is no fast train running in Norway. Even on the comparatively level stretches speed generally does not exceed about 55 m.p.h., but the hill-climbing is as fine as any to be observed, when the moderate size of the locomotives is taken into account. On the Oslo-Bergen line 4–8–0 compounds are largely used, with coupled wheels only 4 ft. 5 in. in diameter. The most powerful variety has a weight of 79 tons, without tender —less than that of a "Royal Scot." They are splendid hill-climbers, however, and one of the few examples, outside France, of a really well-designed compound in which the high-pressure and low-pressure cylinders both do an accurately proportioned share of the total work. With a train like the day express eastbound from Bergen, these engines climb the terrific 1 in 46 ascent from Voss up to Finse at about 27 m.p.h. with anything up to 250 tons behind the tender.

Conditions on the longer main line northward from Oslo to Trondheim are almost as severe, and until recently 4–6–0 locomotives were employed, in pairs when loads were heavy. Some remarkable 2–8–4 locomotives, known as the "Dovregubben" type, have now been put to work. Like the smaller types that have borne the brunt of the work for a long time, they are compounds, and very carefully designed as regards weight distribution. The permanent way is comparatively light, by British standards, and the very maximum axle load permitted is 15½ tons, against 22 tons here. In the building of these new engines, constructed entirely in Scandinavia, a considerable amount of weight reduction has been effected by welding joints, instead of riveting, and by the use of Duralumin for the running plates, cab sides, and other details. The new design has proved a great success, one of the class taking a load of 300 tons up the 1 in 55 ascents of the Trondheim line at 40 m.p.h., compared with 33 m.p.h. by two 4–6–0s with the same load.

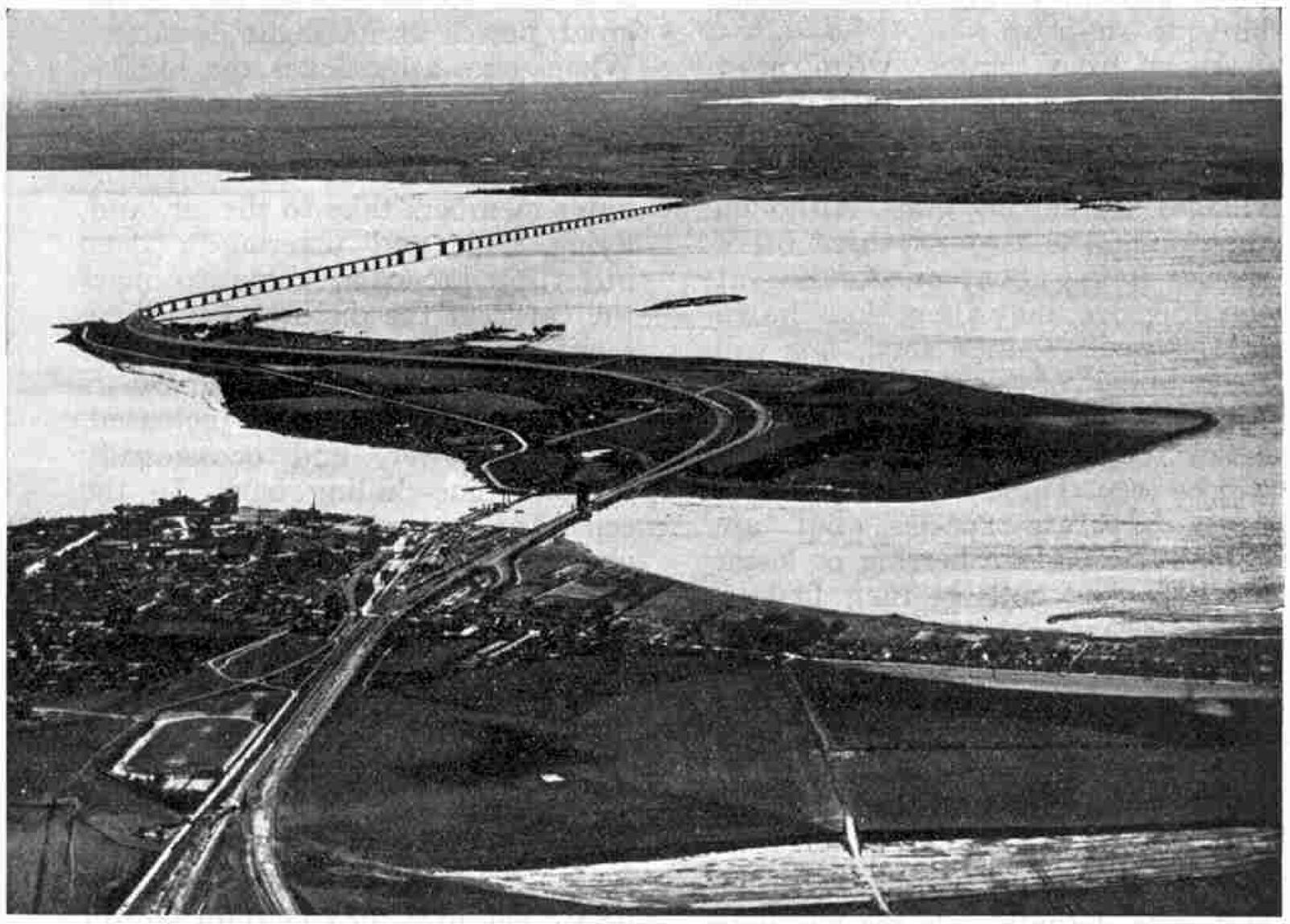
This route, which is 343 miles long, was completed as recently as 1913. Until then the only means of railway communication between Oslo and Trondheim was by a somewhat longer route that involved two breaks of gauge. Quite a number of railways in Norway were built to gauges of 3 ft. 6 in. and 2 ft. 6 in., and the inconvenience in handling freight, when every package had, at some intermediate point, to be transferred from one wagon to another, can well be imagined. The route over which through traffic is now taken is standard gauge, and in crossing the Dovrefjeld it reaches an altitude of 3,363 ft. above sea level. Much of the country passed through is very sparsely populated, and with the exception of a few through expresses mixed trains generally suffice. On these a single passenger coach is conveyed, next to the engine, and at the wayside stations serving tiny hamlets trains are stopped when required by the simple process of hailing the driver—just as one might do in England with a bus or tram. Although certain sections of line are equipped with modern signalling, traffic is generally operated on the train-despatcher system so widely used on the western lines in America.

The nature of the coastline, with high mountains going sheer down to the sea and fjords penetrating far inland, makes anything in the way of a coastal route quite impracticable. It was not in fact until 1938 that Kristiansand, in the south-west, was linked to Oslo by rail, and the extension of this line to Stavanger—famous for the numerous and daring R.A.F. raids on its airport, is still in course of construction. Narvik in the far north has no railway communication with the south of Norway, but inland there runs a highly important line leading to the iron ore district of Sweden, of which the Nazis were so anxious to obtain control. Only 28½ miles of this railway lie in Norwegian territory, for at this distance from Narvik it crosses the frontier into Sweden; thence it continues by a very mountainous route to the port of Lulea, on the gulf of Bothnia.

This ore railway lies well within the Arctic circle, and is electrically operated. For the first 20 odd years of its existence steam locomotives were used, often in teams of three on the heavy ore trains, but in 1923 overhead electric working was begun. In such latitudes extremes of cold are experienced every winter, and special precautions have been taken to ensure regularity of service. Electric rotary snow ploughs are used for patrolling the line, and since the current is generated by water power it was decided to locate the machine room of the main power station 170 ft. below ground level, as a protection against the intense cold. Trouble occurs also at the time of thaw in the spring and early summer, from avalanches, and long stretches of the line are equipped with snow sheds. Some tremendous loads are worked unassisted by the remarkable electric locomotives on this line; an average train consists of 40 to 50 six-wheeled hopper wagons, having a total tonnage of 2,300. To avoid changing locomotives at the frontier, Swedish and Norwegian machines are used alternately.

But iron ore does not constitute the entire traffic carried over this line; through passenger carriages are run between Narvik and Stockholm, a distance of 986 miles. The journey southward from the ore line proper leads through Swedish Lapland, a region of great beauty during the short summer, to a more genial country; and fine rolling stock, and big windows add to the enjoyment of the journey.

Unlike that of Norway, a large proportion of Swedish railway mileage is not owned by the state, and there are still greater complexities in the way of gauge variation. Again in striking contrast to her neighbour, Sweden is making extended use of electric traction, on the main lines especially. The difficulty of obtaining a satisfactory locomotive coal may partly account for this, but at the same time the physical nature of the country is extremely favourable. Whereas in Norway the mountains go down sheer to the sea, in Sweden there is a fairly broad plain east of the great range that forms a natural frontier between the two countries; and the mighty rivers, swift-flowing to the Baltic, are most conveniently harnessed. As a result of this extensive use of electric traction most of the steam locomotives at work in Sweden are interesting in their historical obsolesence, rather than as modern motor power units. Some powerful 2–10–0 engines formerly used on the ore line have now been transferred to the Oslo–Trondheim section of the Norwegian State Railways, and some useful 4–6–0 express locomotives were recently transferred to Denmark. Speeds are not generally high, 60 m.p.h. being about the maximum on main lines.



An aerial view of the Storström bridge, Danish State Railways.

"Let's Feed the Gulls"

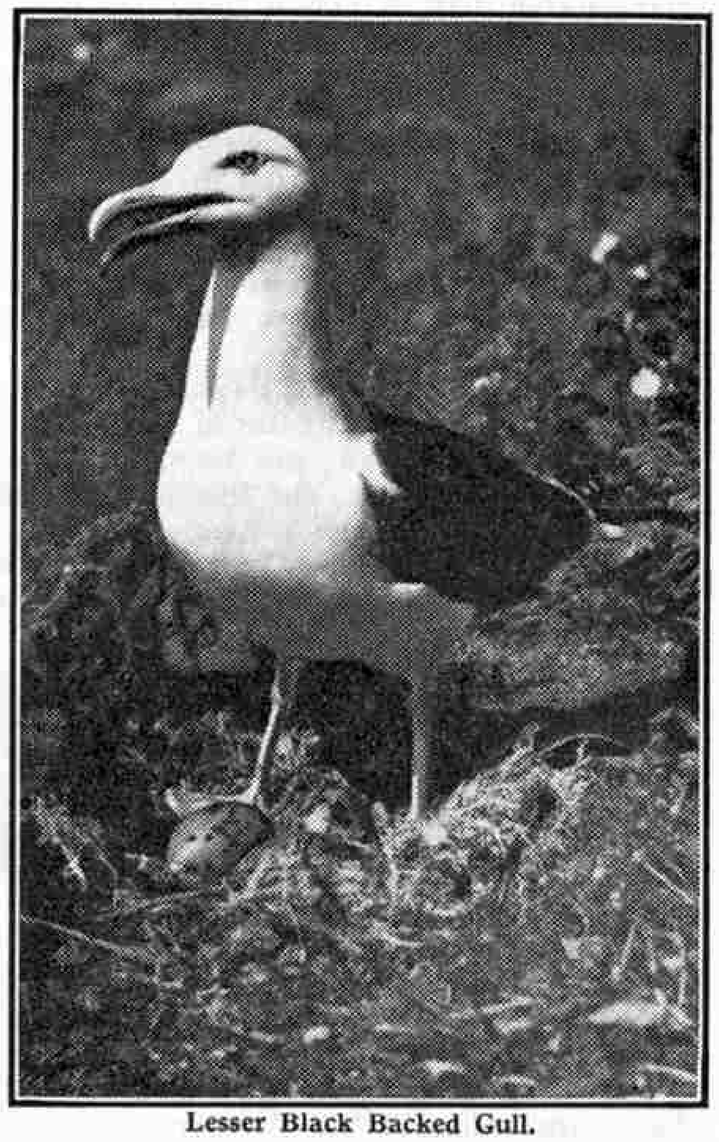
By H. Auger

"COME on, let's go and feed the gulls." Which of us has not at some time, on a trip to the seaside, hit on this idea of amusement? During a walk along the promenade or quayside at almost any time in the summer we may see a small crowd gathered round someone holding scraps of bread for the screaming birds to snap up.

Apart from winter, when most wild birds are more tolerant towards humans, practically the whole of the gulls fed at seaside towns and villages are herring gulls. Although there may be two or three other species flying about or standing at the tide edge, they are seldom drawn to the easily gained food, nor will they allow of a close approach. Among a number of gulls being fed, a few sombre mottled brown birds will be seen. These at first appear to be a separate species, but are actually immature herring or lesser black backed gulls in their first or second year.

Out of the six species of gull resident in this country, the herring gull is perhaps the most frequently seen; and out of the six, four only are "sea" gulls, the black headed and common gulls being land birds. Strictly speaking only the kittiwake is a "sea" gull, as it is the only one to obtain the whole of its food from the ocean. All the species may be observed from many places round our coast, however, particularly in the nesting areas.

The largest and most striking of the gulls in this country is the greater black backed gull. Not until it is seen in the nesting area is the great power of its flight apparent. When one approaches the hillside where there is a colony—nearly all greater black backed gull colonies are on hillsides or hillcrests—the outer members take to the air, and, flying high and uttering a deep interrupted cackle, come to meet the cause of the disturbance. These scouts circle overhead, and as the colony is neared the convoy is increased, the cackle is increased, they fly lower, and occasionally give a spine-chilling bark. In the centre of the nesting area a casual glance round discloses several nests, huge hollows filled with heather, bracken, moss, feathers, and strewn around with the skeletons and wings of many puffins, and if in Wales, shearwaters. Generally the nest is surmounted by a large stone or outcrop of rock, and this serves very effectively as camouflage both for the sitting bird and the nest itself. The nest may contain two or three large light-brown blotched eggs, which would make the eyes of any egg-collecting schoolboy sparkle with envy.



Lesser Black Backed Gull.

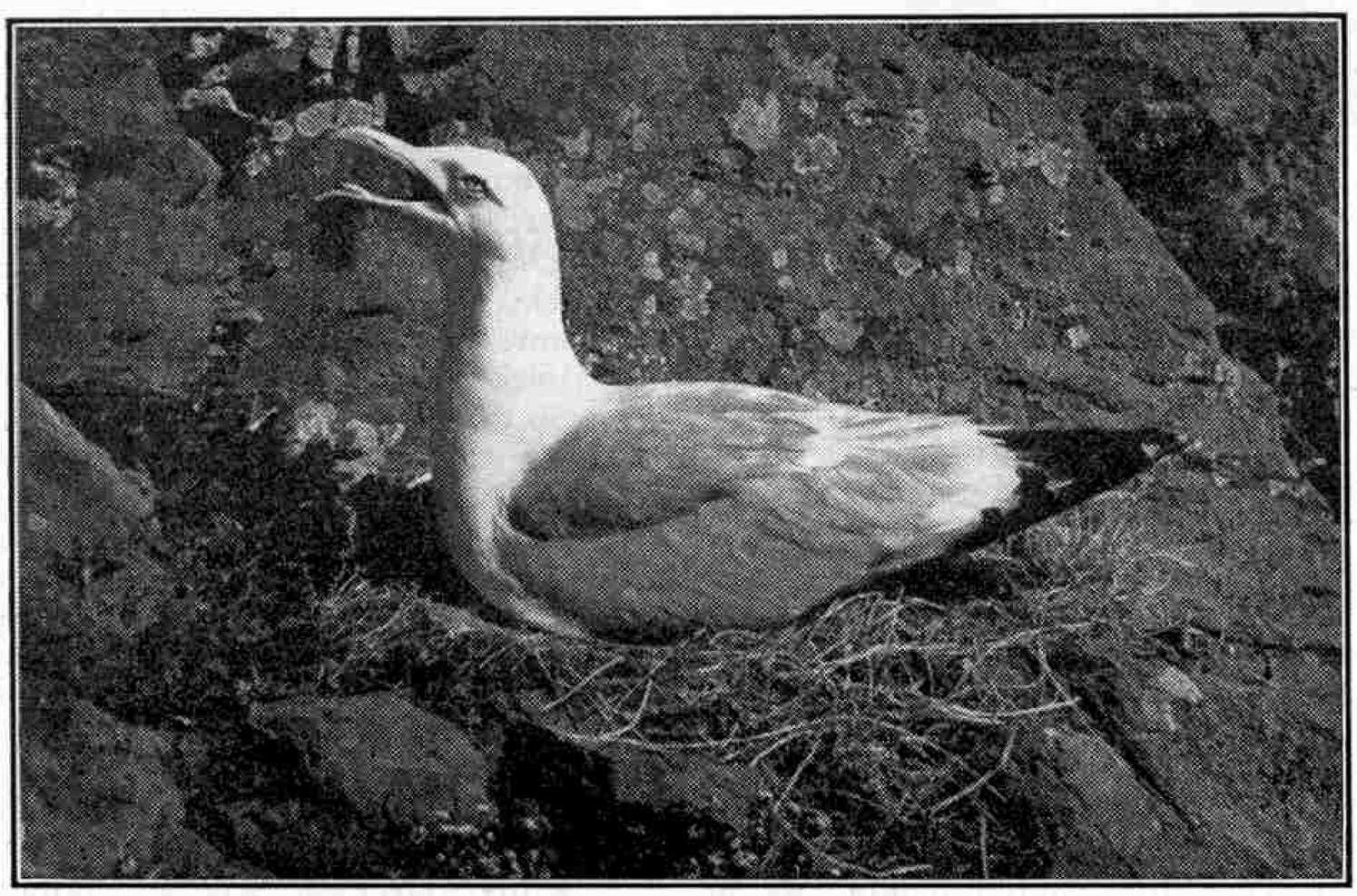
Lying around the nest, and particularly at the back of the stone crowning the nest, will be found many large pellets. These pellets or castings, consisting of undigestible food, are thrown up from the gull's stomach, and contain feathers, bones, claws, etc. It is because of this diet that measures are taken in some parts of the country to keep down the numbers of these birds. This is done by vigorously shaking the eggs, thus preventing incubation; if the eggs are taken the greater black backed gull merely lays more.

The majority of the puffins and shearwaters that fall victims to these villains of the wilds have been seized by the back of the neck as they leave the burrows in which they nest—just plain murder. Many more puffins, whose remains are rarely seen, are caught by a more sinister method. Early in the morning flocks of puffins, razorbills and guillemots lazily float about in the sun at the foot of the nesting cliffs, and it is here that a solitary greater black backed gull will exercise his prowess. Very gently, the would-be assassin paddles his way into the thickest part of the unsuspecting flock almost imperceptibly, as though he were being blown along by the breeze. The puffins take little notice, or rather they seem intrigued by this white fronted monster. Singling out one or two he edges his

Black Headed Gull.

way nearer until, when he is within four feet of his prize, he gives one terrific sweep of his great wings. The puffin dives, but too late; that great hooked bill plunges below the surface and fastens into the doomed bird's neck.

Less in size but similar in habits, the lesser black backed gull lacks the power of the greater black back,



Herring Gull panting in the Sun.

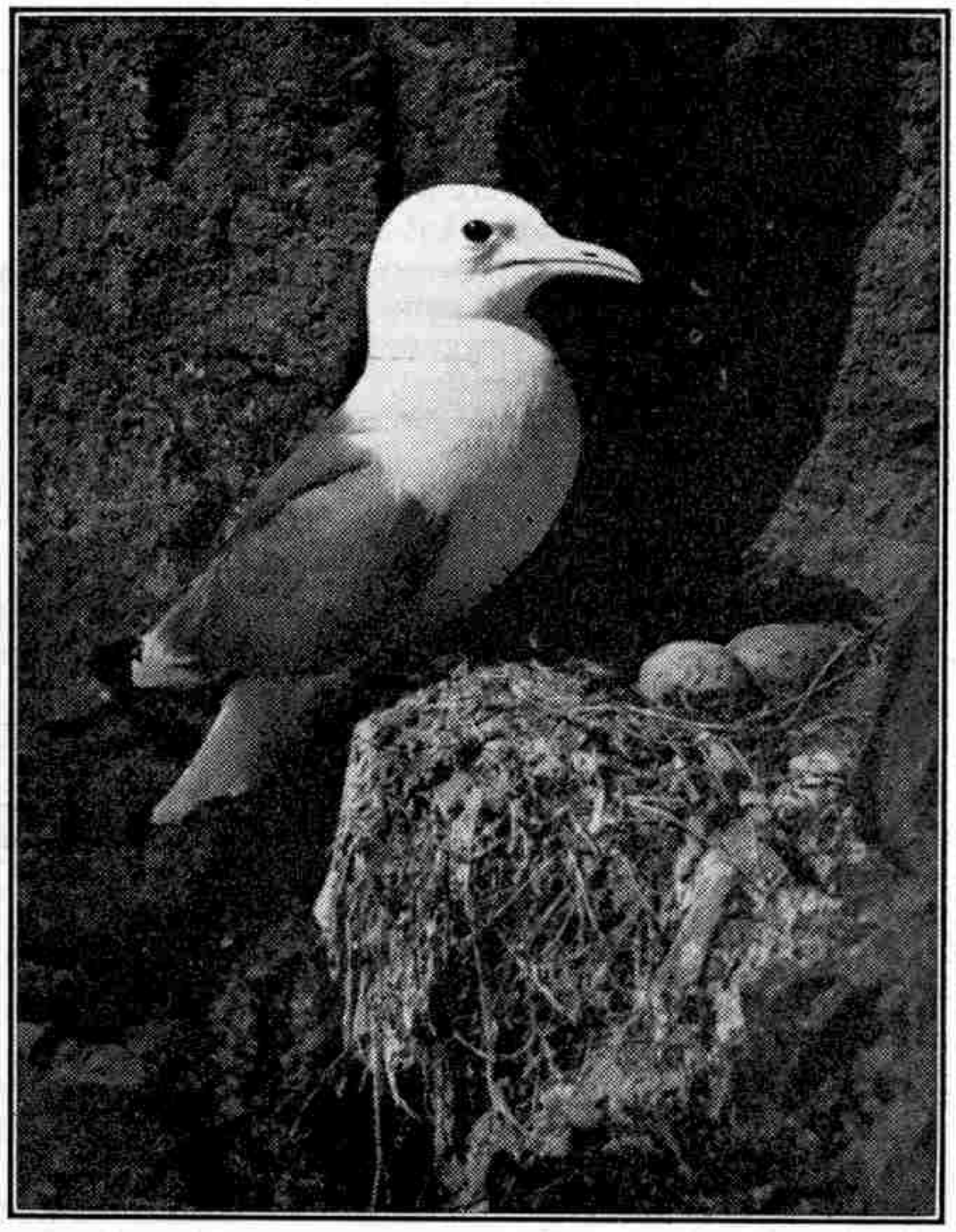
but although it does not kill adult birds it devours large quantities of chicks and eggs. Both the black backs rarely nest on the East coast of England, preferring the Welsh islands and Scotland, and choosing the slopes of a moor or sometimes, in the case of the lesser black back, the shores of a remote loch.

The smallest British gull, the kittiwake, is perhaps the most attractive of them all. Unlike all the other gulls it is non-aggressive, minds its own business, and is a delight on any part of the coast. The kittiwake is so much of a "sea" gull that it may only be observed at the nest or from a boat. The nests are in well-defined colonies in the steepest parts of the cliffs, and are built on what appear to be almost impossible ledges. They usually contain two or three creamy eggs speckled with brown and pale mauve. When the young are hatched and receive their feathers they are by far the prettiest of all gulls, being white with a striking black band across the wings and tail. When seen from a boat, several kittiwakes fishing over a shoal of small fish are an interesting sight, hovering until they see a fish near the surface, and then plunging in to reappear quickly with the catch. Judging from the frequency of the dives, the number of fish devoured must be quite large.

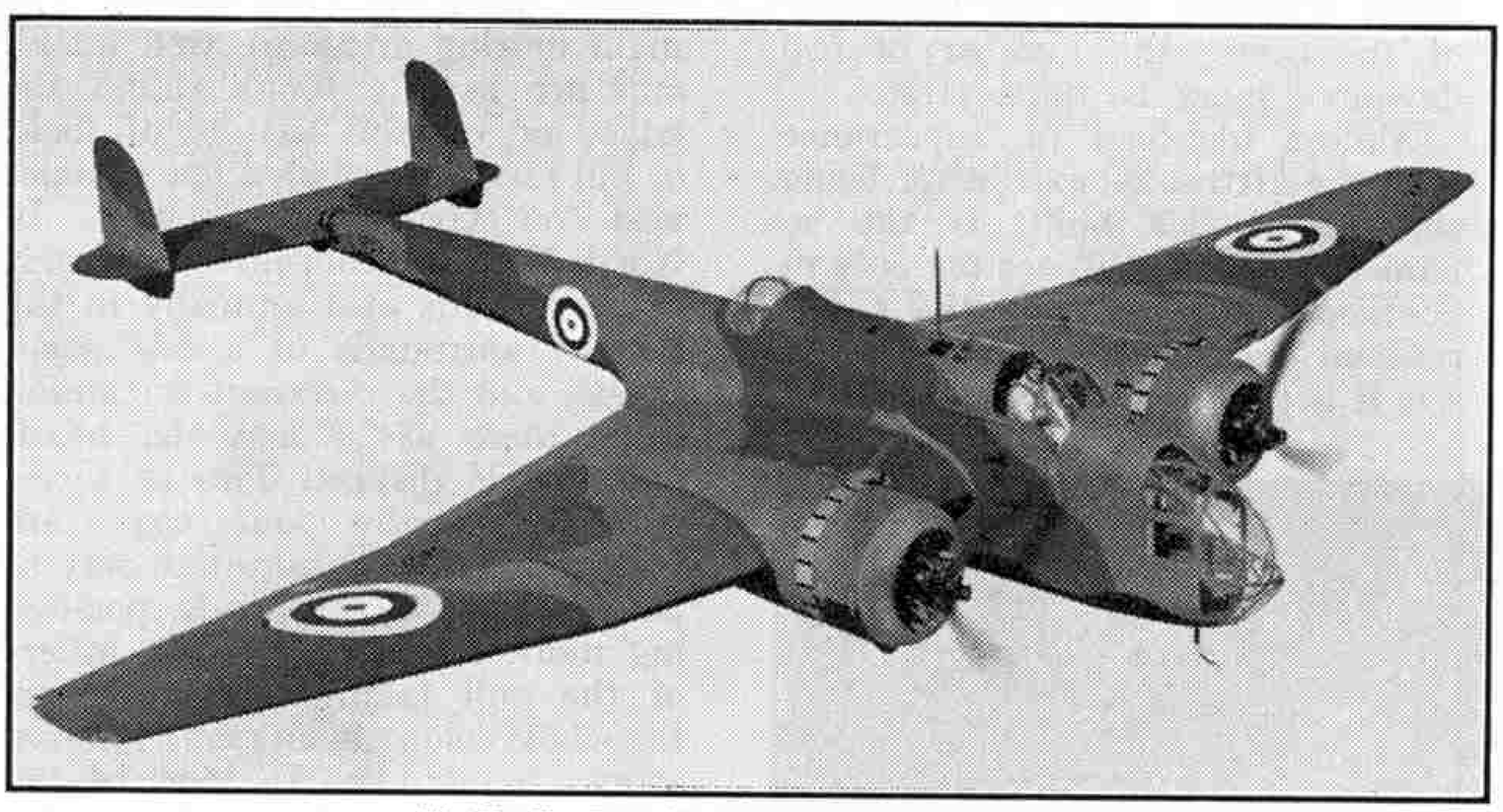
Almost identical in appearance with the kittiwake, except for being slightly heavier built, is the so named common gull, nesting only in Scotland, and probably the rarest resident gull in this country. For its size it is even a greater outlaw than the great black backed gull, actually searching the moors for eggs and chicks. Nesting singly or in small colonies, this gull lays its two eggs in a rough nest round the shore or on an island of a lock or large river. Unfortunately in winter time, when the common gull migrates South to more accessible districts, it is very difficult to identify from the black headed gull, and thereby may pass unnoticed.

The black headed gull leaves no doubt as to its identity in Spring and Summer with its chocolate coloured head and blood-red bill and legs. It is well distributed, frequenting all the main rivers and flatter parts of the coast. The main nesting areas are well inland and are usually found round the edges or on the islands of lochs or hill tarns, although a few colonies nest on coastal mud flats. In North-West Lincolnshire thousands of these birds nest annually in the marshy surrounds of a few small ponds, and the incessant screaming from these areas may be heard half a mile distant. Two or three, and occasionally four eggs, are laid in a fairly substantial nest of marsh plants. Black heads, possessing more team spirit than others of the gull family, will turn out the whole colony in an effort to drive away an intruder. In view of the large quantities of eggs taken for food each year, it is surprising that the number of birds and the number of colonies are steadily increasing. Even in this species a few individuals take a liking to eggs of other birds, but the majority do a large amount of good to the farmer as many of the injurious grubs are their main diet.

The black headed gull's harsh scream over the lonely heath is a welcome sound, as is that of the kittiwake and the herring gull on the dark cliffs, being in keeping with the wilder and more remote parts of our country.



Kittiwake.



The Handley Page "Hampden" long-range bomber.

With the "Hampdens" to Stavanger

By Captain H. S. Broad, A.F.C.

In this article you are taken to Norway and back in the cockpit of a raiding bomber, to see for yourself just how the R.A.F. deal with such a situation.

THINGS had been very slack at the bomber station near the East coast of Scotland. The only action so far seen had been by enemy raiders, and one of the Squadron Leaders, a veteran of the last war, was wont to compare this idleness with the "good old days of 1917–18."

It was natural that his leg should be pulled a good deal by his colleagues, most of whom were at least ten years his juniors. He took it all in good part, but privately resolved that if and when the time came, he would "show the young beggars that he wasn't a back number."

With Hitler's invasion of Norway came his big chance. At noon one day he received orders that his squadron of "Hampdens" was to attack Stavanger Aerodrome at dawn next morning. He and his pilots were shown excellent aerial photographs of the place they were to bomb, and the skeleton of a plan, to be modified if necessary on the spot, was made.

Rather more than two hours before dawn—for they would travel towards the sunrise—the nine "Hampdens" took off in quick succession, with enough Moon to render the use of a flare-path unnecessary. Their pilots followed the Squadron Leader as he, piloting the foremost machine, turned on to the course already set for him, and then formed up in three flights of three in the familiar V-formation.

In the interests of petrol economy he would climb very slowly until he reached operational height. As he crossed the coast he could see, a bare 1,500 ft. beneath, the breaking of the surf on the shore, and at this point he felt a fluttering of the heart that he would have hated his subordinates to guess at. Was he not the veteran of many battles, above all such weaknesses, and yet, if the truth must be known, as anxious as any youngster to justify himself in this, his first modern raid?

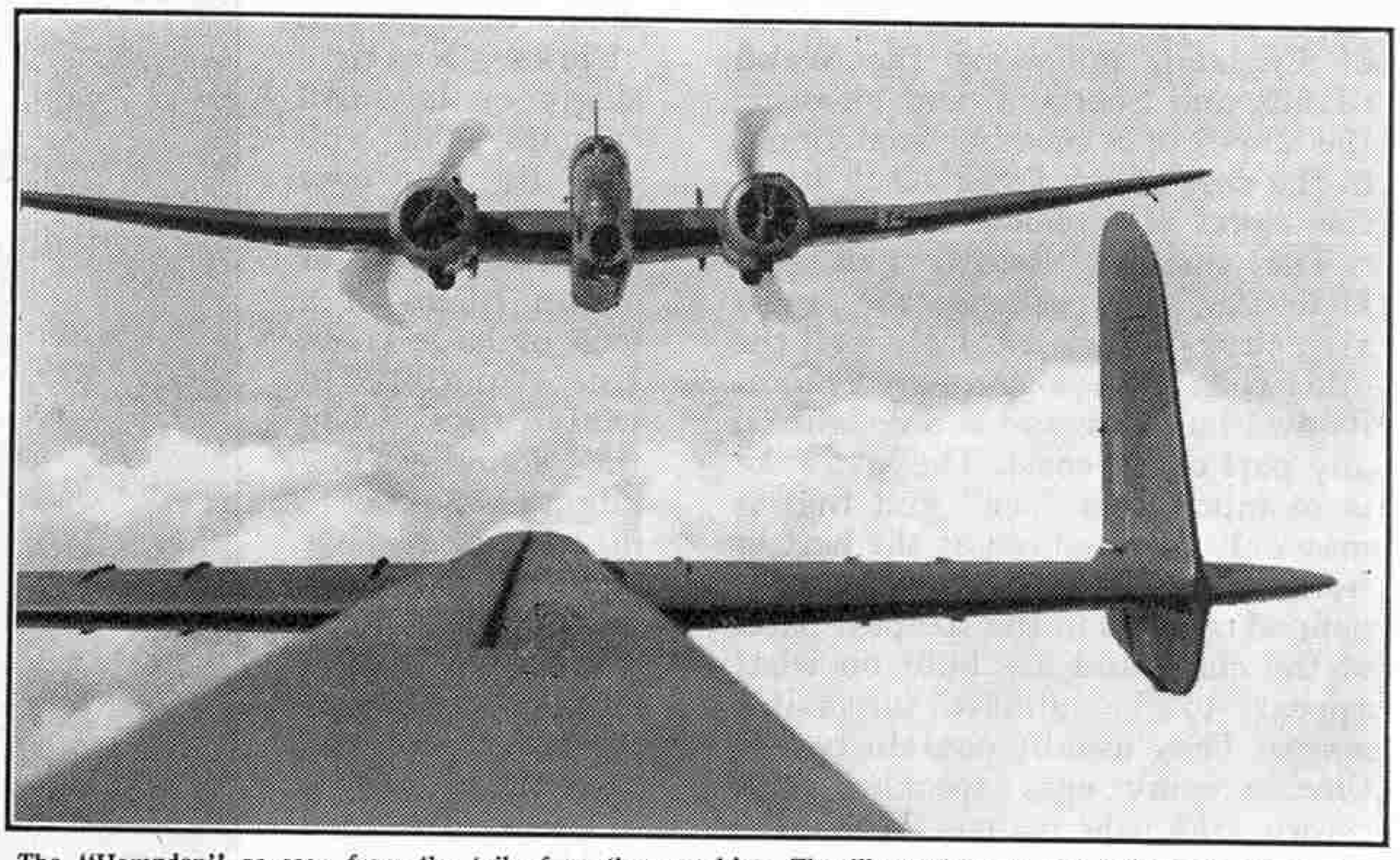
His Air Speed Indicator flickered ever so slightly around the 150 m.p.h. mark, showing that he was climbing at just the right speed. The altimeter needle moved almost imperceptibly across the dial—he would be climbing for an hour before he reached "operational height" around the 12,000 mark.

The "Hampden" is not a sociable machine. The pilot sits high up in a narrow cockpit whose sides he can touch with his elbows. Below and right in the nose sits the man who acts as bomb aimer, front gunner and navigator. Behind the pilot are two rear gunners, one firing a pair of machine guns from above the fuselage, the other another pair below. The top gunner acts also as wireless operator.

So the Squadron Leader settled down to his own thoughts, which turned to details of the coming attack. Once he was roused by a searchlight beam that sprang to life below and picked out a tramp steamer in its glare. Shortly afterwards the glare was turned on him, but went out as he flashed his recognition signal. The ship behind the searchlight, doubtless a British warship, was invisible.

A little later came his navigator's voice over the earphones, checking the course; and then they flattened out, while his eye took in the new air speed reading, 146. This indicated a true speed of some 172 m.p.h., which was just about right for their purpose.

An hour passed—a peaceful hour, with nothing visible save a few waning stars above, and the faint white of the sea below, for the other



The "Hampden" as seen from the tail of another machine. The illustrations to this article are by courtesy of "The Aeroplane."

eight "Hampdens" were all astern of him; and after 25 years' flying you don't require conscious effort to watch your instruments.

Suddenly he found himself straining his eyes ahead for a sight of the Norwegian coast, which should now be visible. Certainly there was a lightening of the sky, but no mountainous coastline could be seen. This could only mean one thing—a headwind had sprung up since they started. Their attack must now be made in broad daylight. He opened the throttle a little—there was no need to give the enemy more time than necessary to wake up!

At last the line of mountains showed up behind the coast—snow-capped, he knew, but for all that appearing black with the rising Sun behind it. He let the stick go forward a fraction, for they had a lot of height to lose. "You'll make your own adjustments for bomb deflection on account of the headwind," he told his navigator who, you will remember, was also the bomb-aimer. He repeated this instruction to the other machines. They could doubtless be trusted to look after such details, but the responsibility was his.

Right on course, he flew across the neck of land that separates Stavanger from the open sea, and easily picked out the long narrow aerodrome, now fully illuminated by the risen Sun. Even at this early hour there were nearly 30 aircraft, mostly twin-engined stuff, ranged along both long sides and one end, dispersed so as to make the business of bombing more difficult. Down one side was the line of hangars, and the main runway down the centre could not be overlooked. It bore ocular proof of the effectiveness of former raids.

It had been arranged that the Squadron Leader and the other two machines of his flight should attack at once. The other two flights would separate and attack low down, one from each side, at rapid intervals so as to distract the enemy's fire.

But as he turned a few degrees so as to rake the side of the aerodrome containing both hangars and aircraft, the leader thought he had never watched a more peaceful scene. At the pre-arranged height he flattened out, noted carefully that his A.S.I. showed 220 m.p.h., and held it steady at that. Not a gun was fired; there was little sign of movement; there were, of course, no searchlights.

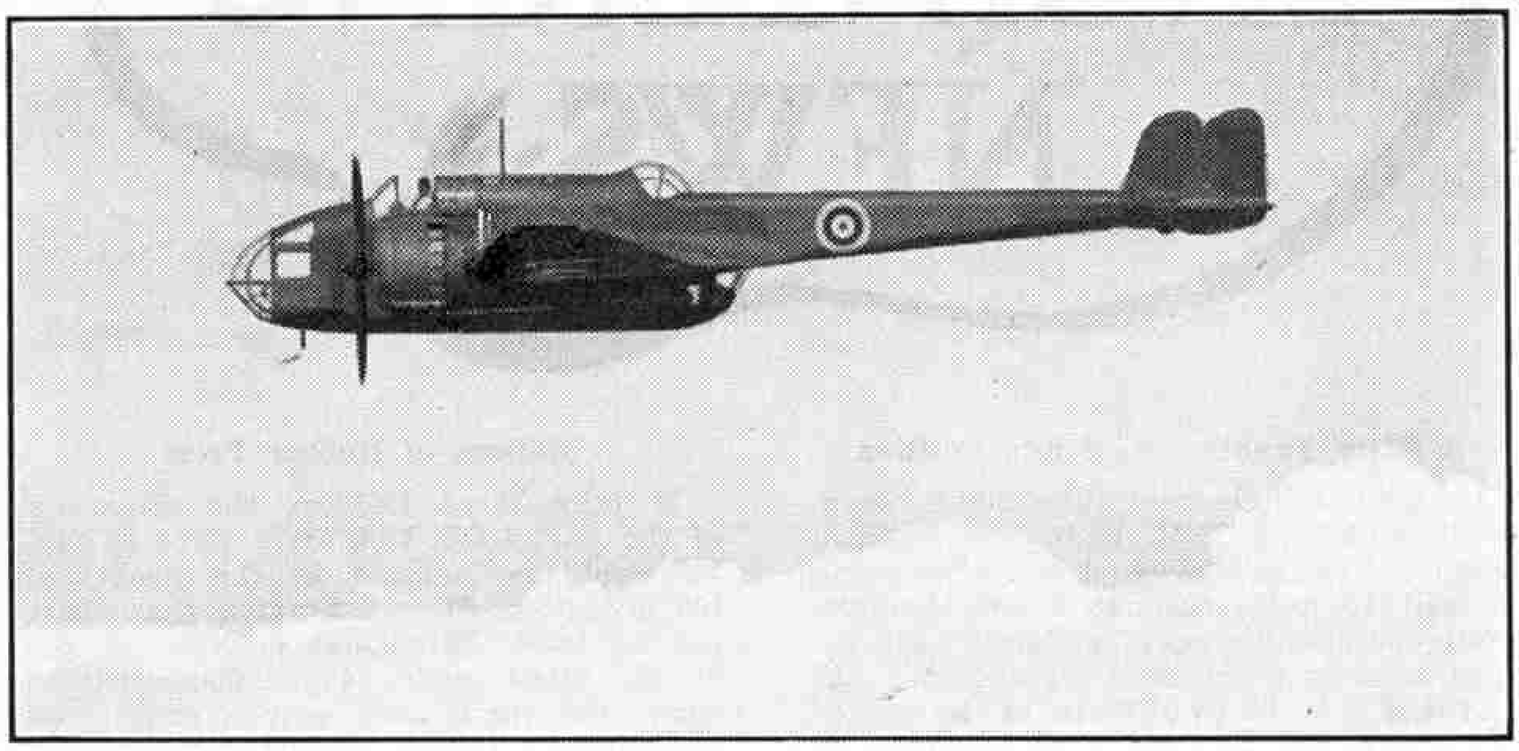
He knew his bomber would be doing his job efficiently but of course could neither see nor hear any effects. He knew his consorts would follow at fairly long intervals, but neither could he see them as he flew inland for two or three minutes to give the cross-attacks a chance. And then he turned.

He was now to fly directly over the objective again at a low height, attacking with all the machine guns he could bring to bear on anything worth shooting at. Losing height rapidly for this purpose, he could not see the aerodrome for a full minute. When he did, what a change!

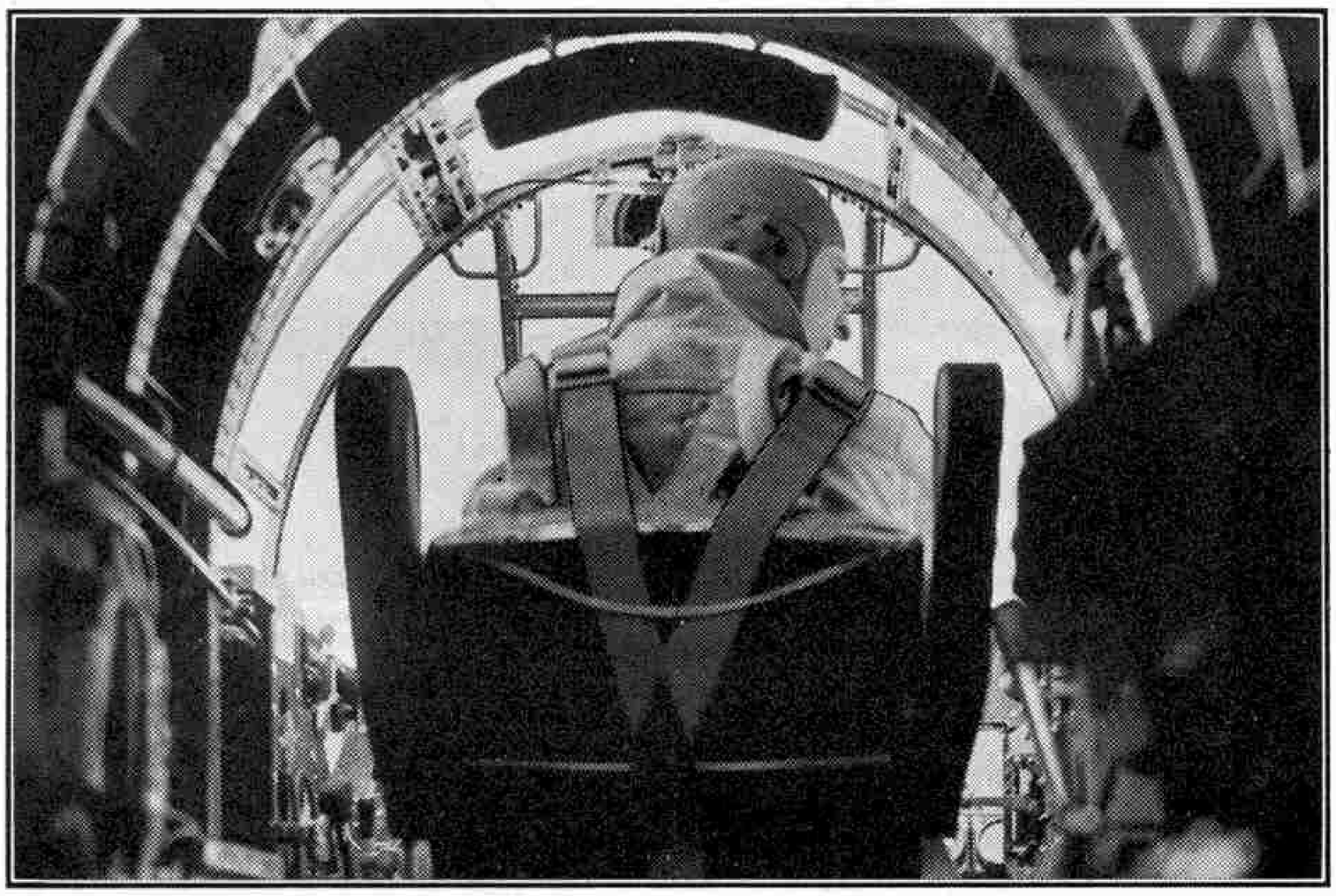
The hangars at the landward end had partly collapsed and were blazing furiously. Half the aircraft visible were either on fire—incendiary bombs had formed part of his load—or were in ruins. And the enemy had awakened with a vengeance. A welter of flashes from every side showed where the machine guns and pom-poms were in action.

He tore across the aerodrome at 600 ft. with motors wide open and the A.S.I. showing 280. This was more than his normal maximum, but he had gathered speed in the dive. All five of his own guns were now blazing away; he knew not at what, but steered as close as possible to the groups of men lighted up by the lurid flames—evidently fire-fighting squads. The longer those flames continued, the more damage they would do to the enemy.

There came a flickering in front of his eyes, and looking down he noticed a hole in his left sleeve. Yes, and enamel was chipped off the throttle control box at his left hand. Phew! That must have been a near thing. He wondered how many bullets had passed (*Continued on page 314*)



A broadside view that shows the positions of the four gun stations.



Flt. Lt. J. R. Talbot flying the Handley Page "Hampden" from which "The Aeroplane" staff photographer took the pictures on these pages.

ENGINEERING NEWS

A River Tunnel Towed into Position

A large double-steel tube 200 ft. long, 40 ft. wide and 25 ft. high, was recently anchored in the Chicago River after being floated 15 miles through Lake Michigan from the maker's works at South Chicago. The tube is to be sunk in a trench excavated to a depth of 30 ft. in the bed of the river, and covered with concrete. It will form part of a subway through which tramcars will pass from one side of the waterway to the other.

The steel shell is shown in the illustrations on this page. In the upper of the two pictures it is seen after some of the concrete had been poured, and in the lower one as it was being towed down Chicago River to the position where it is to be sunk. The tube weighs 6,500 tons and was made buoyant by sealing both ends.

By adopting this method of construction it has been possible to reduce considerably the depth of the tunnel below the river bed. With an ordinary bored tunnel at least 15 ft. of earth covering would have been required, while only 5 ft. of coverage is necessary with the sunk tube system. This feature provides an easier grade in and out of the subway than would have been possible with a bored tunnel.

The tube was built by the Graver Tank and Manufacturing Company, East Chicago, and is arc welded throughout. The welding was done by the shielded arc process, using welding generators and electrodes supplied by the Lincoln Electric Company Ltd.

More Fine Warships for the French Navy

It was recently announced in France that two new 35,000-ton warships, the *"Richelieu"* and the *"Jean Bart,"* will shortly be ready for service in the French Navy. Work is now proceeding rapidly on the construction of two sister ships, the *"Clemenceau"* and the *"Gascoigne."*

America Builds World's Largest Tugs

Three of the largest and most powerful towing vessels yet constructed have been built for the United States Navy Department by the Bethlehem Steel Company. The boats have an overall length of 205 ft., and a breadth of 38½ ft., and are named *"Navajo," "Seminole"* and *"Cherokee"* respectively. The *"Navajo"* recently completed her official trials. She is equipped for oil-electric propulsion, the main generating plant comprising four 12-cylinder two-stroke oil engines, each rated at 950 h.p. at 750 r.p.m. Each of these drives a 550 volt d.c. generator that supplies current to one of the four propulsion motors. These are each rated at 765 h.p., and are coupled to single propeller shaft.

Millions of Rubber Tyres

If John Boyd Dunlop, the originator of the pneumatic tyre were alive to-day, he would be amazed at the results of his invention. It is estimated that there are at least 72,000,000 bicycles in the world, fitted with 144,000,000 air-filled tyres, yet these form only a small part of Dunlop's legacy to the comfort and efficiency of travellers and transport. In 1938 British factories alone produced nearly 6½ million pneumatic motor tyres, using in their manufacture more than half the total quantity of crude rubber consumed in this country.

Two views of the 200 ft. steel tube that forms the new Chicago River tunnel being towed into position for sinking. Photographs by courtesy of Lincoln Electric Co. Ltd., Welwyn Garden City.

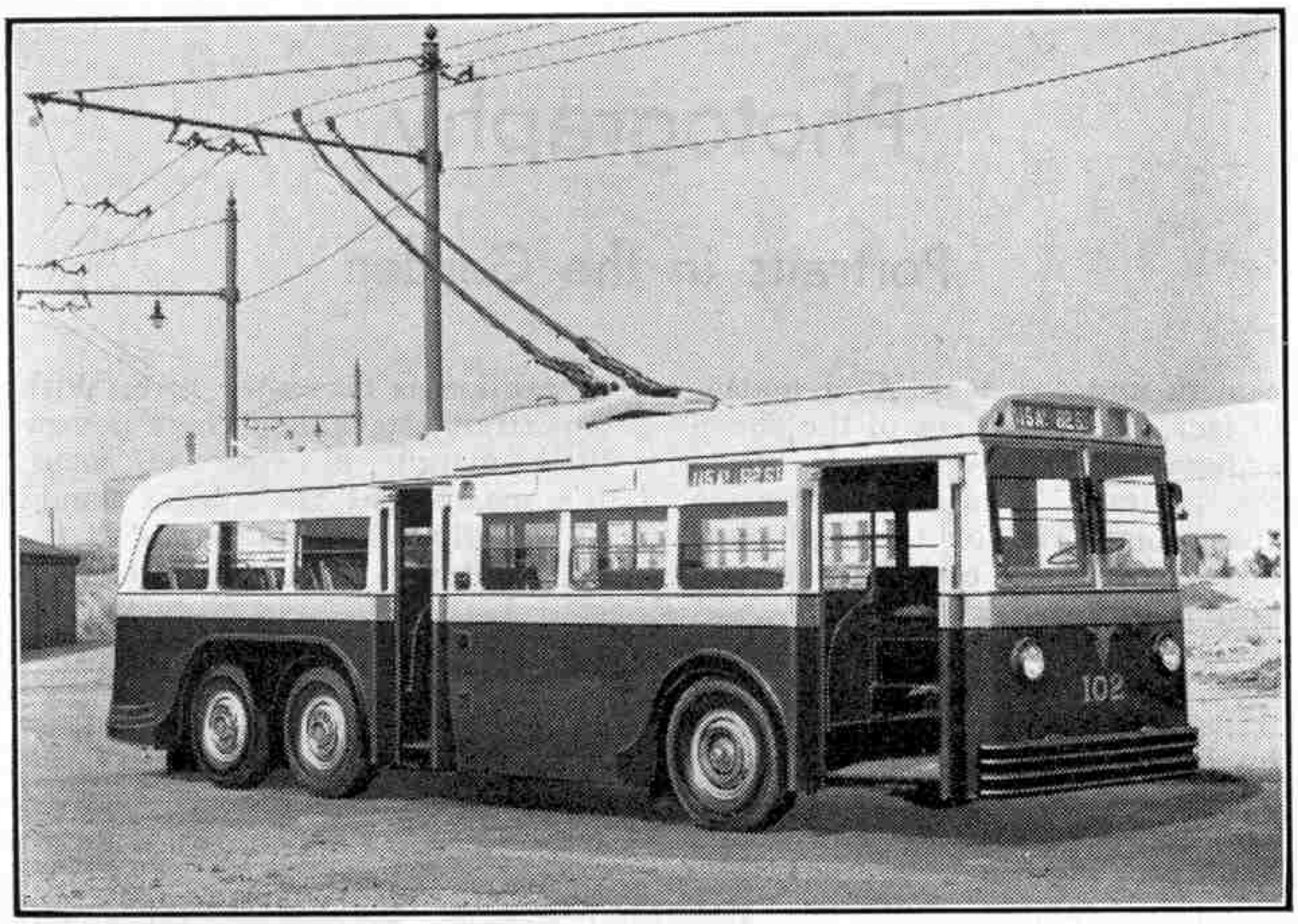
Aircraft development also owes a great deal to the inventor of the pneumatic tyre, and the biggest aero tyres in the world are made in Britain, while Army vehicles in the war zone are now fitted with bullet proof tyres produced in this country. John Boyd Dunlop was born in an Ayrshire cottage, and was a veterinary surgeon by profession.

A New Instrument for Locating Buried Cables

The problem of locating quickly underground electricity cables, water and gas pipelines is one of great importance to electrical undertakings, water boards and similar concerns responsible for laying, repairing and maintaining various public services. Several ingenious instruments have been invented for assisting in this work and one of the latest and most interesting of these has been produced by the L. M. Ericsson Telephone Company, Stockholm.

The device consists of three separate parts, a transmitter buzzer, a cable finder incorporating a built-in frame aerial and a finder coil. The apparatus is based on the principle that electro-magnetic radiations produced by an alternating current in a metalic conductor are capable of affecting a telephone receiver circuit. The alternating current is produced by the transmitter buzzer, which is connected to one end of the cable or pipe to be investigated and also to the earth. Then the cable finder is carried by an operator wearing earphones in the approximate direction in which the cable or pipe is known to be buried. As he approaches the line of the cable or pipe the sounds in the earphones increase in intensity and reach their maximum strength when the instrument is exactly over it.

This process is also useful for determining the exact place of an earth leakage in a cable, as the electro-magnetic radiations and therefore the sounds in the earphones disappear at such a place. Sometimes it may happen that an earth leakage has arisen without it being possible to discover any visible injury to the cable armour after excavation. It is then that the third part of the instrument, the finder cell, is employed. With its aid the precise point of the fault can be fixed.



One of three A.E.C. English Electric 38-seater trolley buses for Edmonton, Canada, on the test track at Southall, England. Photograph by courtesy of Associated Equipment Co. Ltd., Southall.

New Canadian Trolley Buses

The illustration on this page shows one of three new single-deck trolley buses now in service in the city of Edmonton, Alberta, Canada, the first vehicles of this type to be used there. They are A.E.C.-English Electric buses of six-wheeled construction. The four rear wheels are driven by a single 115 h.p. motor, which is mounted centrally in the chassis on a floating rubber suspension attached to a tubular sub-frame and cross members. This arrangement was selected in order to obtain smooth and silent operation and to minimise noise.

Compressed air brakes are fitted to all six wheels. The necessary compressed air for their operation is provided by a combined reservoir and control unit, in which the pressure is automatically maintained at 85 lb. per sq. in. by a two-cylinder compressor coupled to a 500 v. motor of 1 h.p. The brakes are of the internally expanding type, and are operated by a pedal, and additional braking is provided by a hand lever that operates the eight rear shoes independently of the compressed air system. This powerful equipment is rendered necessary by the hilly routes on which the buses work.

Temperatures of 20 to 40 deg. F. below zero are sometimes met in service, and to cope with the severe conditions the rear wheels are fitted with a sanding apparatus that feeds sand to the front and rear of all driving wheels. The provision of such a device in connection with rubber tyres is a very novel feature.

The bodies are of the all-metal type, designed to seat 38 passengers. The trolley-arms are fitted to a bridge that spans the body roof, and the roof itself carries six ventilators, two for intake and four for extraction. The space between the roof and the ceiling of the saloon, and that between the interior and exterior panels of the body sides, are packed with Alfol as a means of heat insulation. The low temperatures in which these buses will sometimes have to work makes interior heating equipment necessary, and 20 electrical heaters are installed.

The overall length of the buses is 31 ft. 8 in., which is very remarkable as the wheelbase measures only 16 ft. 2 in.

Since being put into service in Edmonton, the buses have attracted considerable interest, and they seem to be putting up an excellent performance.

T. R. Robinson.

Remote Control Gear for a Coal Washing Plant

In factories and workshops where a large number of electric motors are installed and distributed over a large area or on several floors, it is sometimes more efficient to start and stop them from a central point in the factory instead of providing individual control close to each motor. This form of control is installed at a large coal washing plant at one of the pits of Glass Houghton and Castleford Collieries Ltd., for which the electrical equipment was supplied by The General Electric Co. Ltd. A general view of the washing plant is reproduced in the lower illustration on this page.

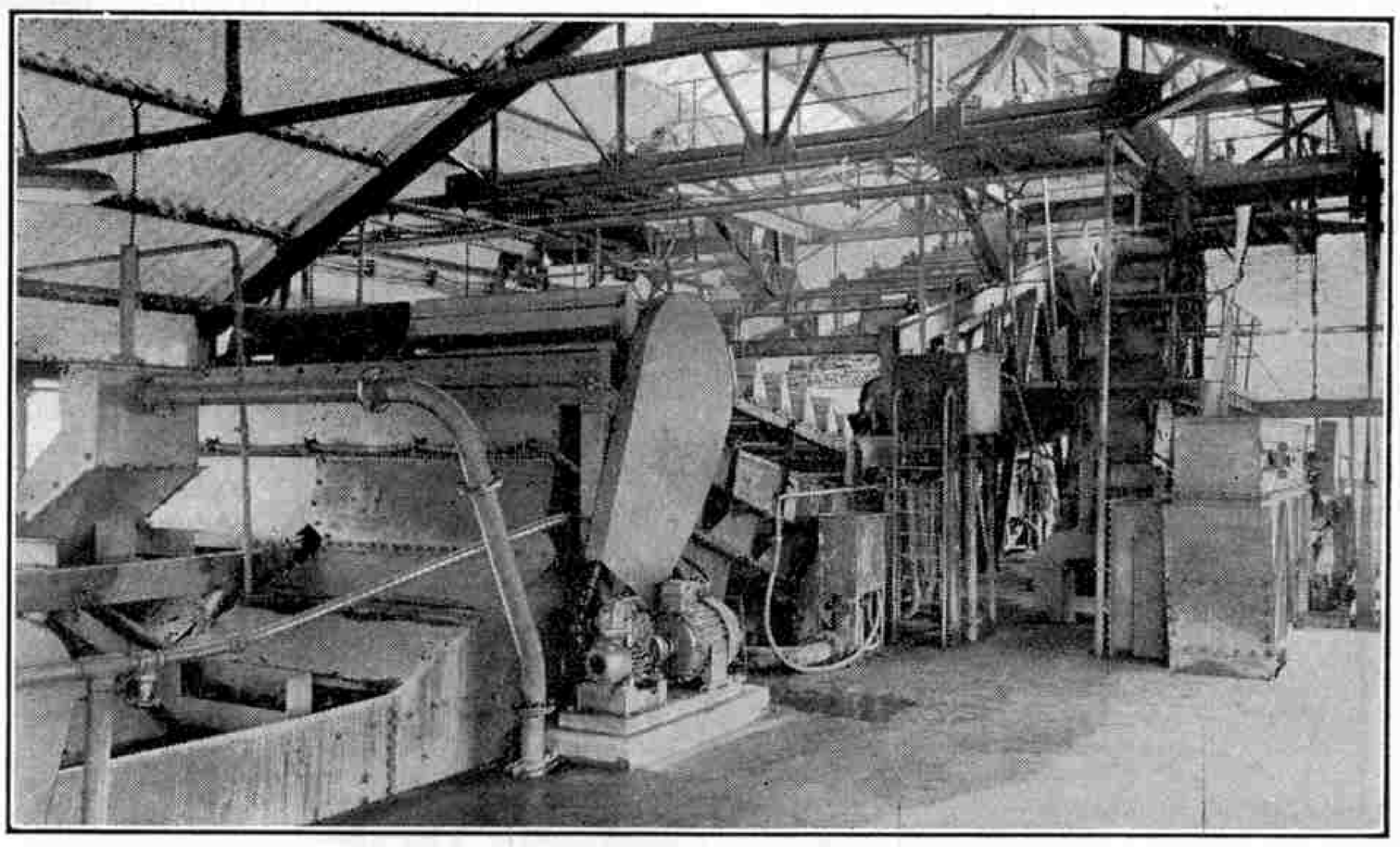
Centralised control for this type of plant possesses several advantages, chief among which are that it enables the control apparatus to be installed in a separate building remote from the washery, so that trouble from dust and dirt entering the switch gear is eliminated, and groups of two or more motors can be controlled from one point, thus simplifying the starting and running of the plant. Another important advantage is that it is only necessary to provide main power cable to the central contactor board, from which smaller cables are run to the motors and push button controls situated at required points in the plant.

In the coal washing plant illustrated the incoming power is a 3,300 v. A.C. supply. This is controlled by two oil-immersed circuit breakers, from which cables are taken to a 500 kVA power transformer and a 75-kVA transformer which reduces the voltage to 110, suitable for supplying lighting circuits. The power transformer steps down the voltage to 440 v., and the current from this is fed to three switch-boards that control motors operating the washing plant, a wagon tippler and various coal handling equipment.

In view of the prevalence of dust and dirt, all the motors in the washing plant are of the G.E.C. totally enclosed fan-cooled type, in which cooling is assisted by an external fan that forces air over the shell of the machine. The motors range from ½ h.p. to 20 h.p. and are controlled by contactor starters installed in a switch house separate from the coal washing plant.

All starting apparatus is remote controlled from six cubicles containing push button switches, which are situated at convenient positions in the washery. Each cubicle controls several motors, and comprises "stop" and "start" push buttons, with a pilot indicating lamp for each motor and an emergency "stop" button that enables the attendant to shut down the complete installation.

Acknowledgment is made to Glass Houghton and Castleford Collieries Ltd., for their assistance in obtaining photographs and for permission to publish this description.



A general view of the coal washing plant referred to on this page. Photograph by courtesy of The General Electric Co. Ltd., London.

"Birds!" by R. H. Warr, Willaston, Cheshire.

Photography

Portraits in the Garden

THE photographer who has access to a garden need never be short of interesting subjects for his camera. Even if the garden is only quite small it will provide useful settings and backgrounds for outdoor portrait snaps of Mother, Dad and the family, and also of the family pets, who have as much right to be photographed as anybody else. Pictures of this kind will be in big demand this year, for almost everyone has a relative or a friend in the fighting Services to whom home snaps will always be very welcome. Every opportunity should be taken of making such photographs, for this is one way of doing a good turn for those who are fighting on our behalf.

Snapshot portraiture has the very useful feature that it can be carried out with practically any camera and any lens. As a matter of fact, the single lens of the cheap camera is in some respects better for portraits than the expensive anastigmat lens of the high-class camera with its elaborate fittings and movements. If the camera is of the fixed-focus type, however, close-up portraits can only be obtained by the use of a supplementary lens generally known as a "portrait attachment." This is either slipped over the ordinary camera lens or clamped in front of it in some kind of fitting, and its effect is to shorten the focus of the camera lens so that a close-up portrait becomes possible. For instance, a small fixed-focus camera may render sharply all objects at a distance of 6 ft. or more, but if we take a head and shoulders portrait with this camera at this distance the resulting image is too small to be of any real interest. On the other hand, if we bring the camera closer to our subject the result is a blurred image that is disappointing to us, and rather apt to cause the subject to feel distinctly "peeved!" By using a portrait attachment, however, the focus of this lens would be altered to such an extent that objects at a distance of 3 ft. would be in sharp focus. Thus the taking of head and shoulders portraits of a reasonable size is made a simple matter.

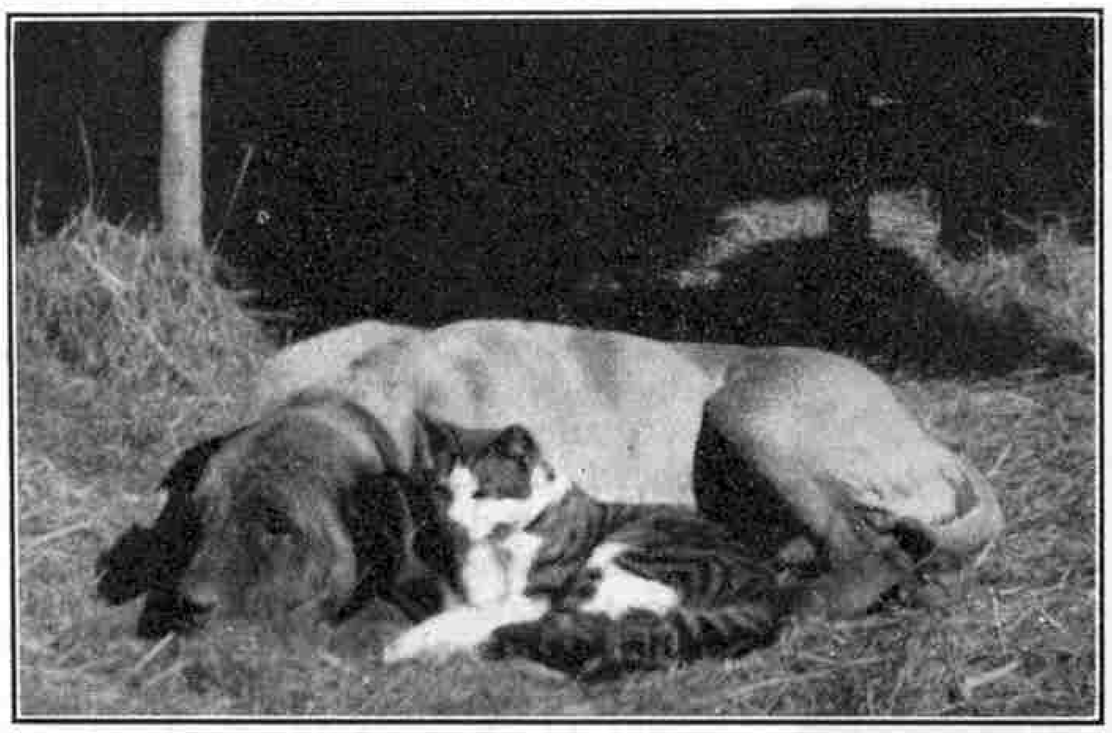
"A drink for the flowers." A garden snap by A. B. Bishop, Bristol.

One word of caution is necessary here. With a portrait attachment there is very little margin of error in focus; this means that the subject should be exactly at a distance of 3 ft., or whatever other distance the particular attachment may be designed for. It is well worth while measuring the distance to make quite certain of accuracy.

Snapshot portraits have gained a reputation for bad quality, and the writer has seen many that might reasonably produce a certain coldness between the photographer and his subject! One of the commonest faults in such portraits is that the face is too dark; and this is generally the result of posing the sitter, or stander, against something that is lighter in colour than his face. Portraits taken with the sky as a background are almost certain to be too dark because the face is actually dark as compared with the sky. Generally speaking, therefore, the sitter's face should have as a background something darker than itself, and no sky should be showing in the picture.

The choice of background is

This beautiful outdoor picture is the work of A. G. Dell West Norwood, London.



"The Good Companions." An interesting animal study by P. W. Sadler, Bromley, Kent.

naturally limited by the resources of the garden, and there may be nothing more artistic available than a wall or ugly trelliswork. Such a background serves a useful purpose, but we do not want its details to be conspicuous in the pictures. We therefore place our sitter a good distance in front of the background, and focus sharply on him so that the background is more or less out of focus, and appears inconspicuous in the picture.

Writing of focusing the sitter reminds me of certain portraits I have received recently from readers with requests to know why the results were so dull and lifeless. On careful examination of these prints I found that one defect, and perhaps the most serious of all, was that the eyes of the subject were out of focus. If your camera is of a focusing type, make sure that the sitter's eyes are quite sharp, and then the rest of the face will look after itself.

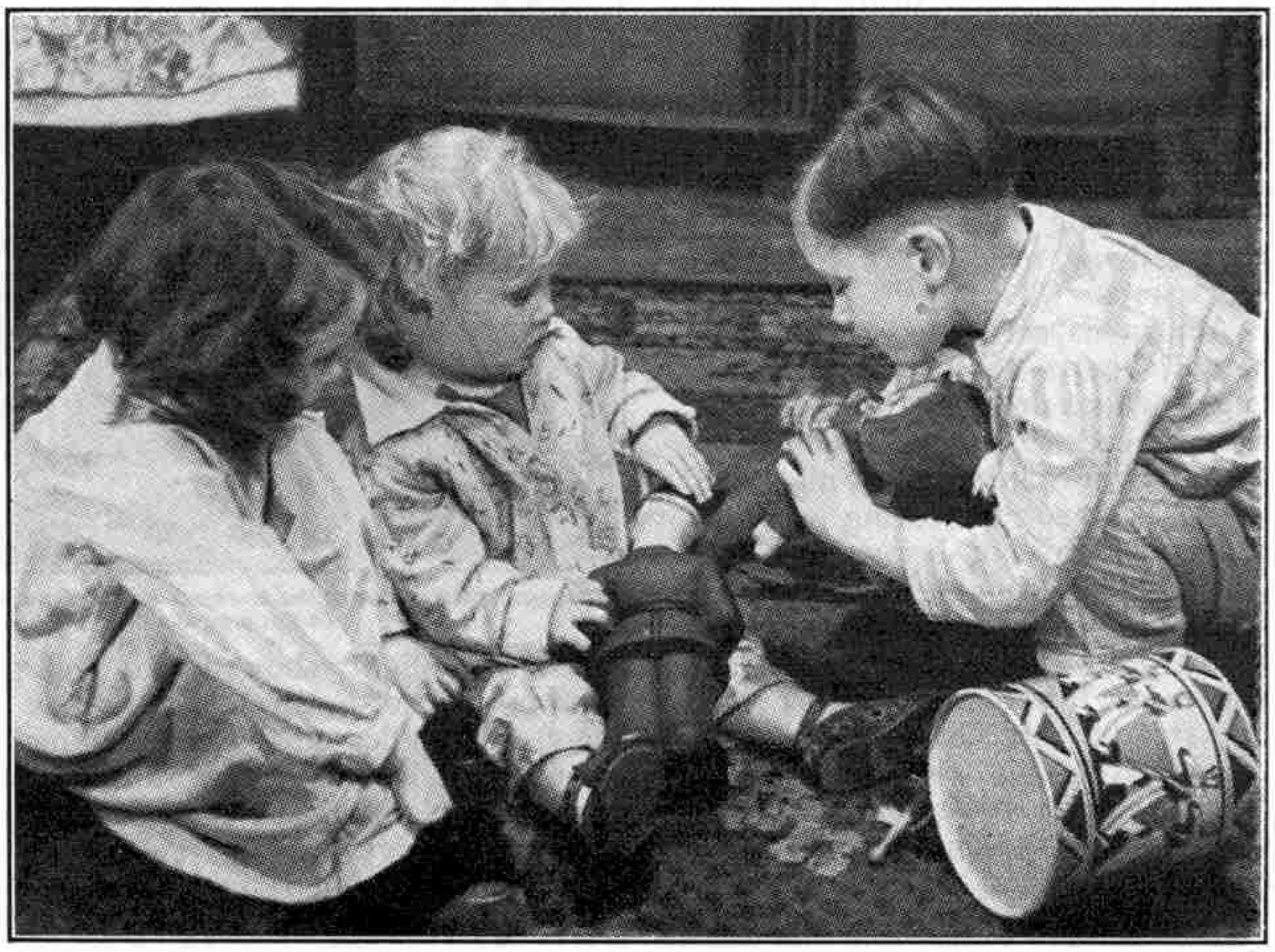
Portraits taken in full sunlight are apt to show sharp contrasts that are very undesirable, and if it is at all possible some method of diffusing the light should be adopted. There is no great difficulty in doing this. If a light-coloured sunshade, or one of the familiar beach umbrellas, is available, it can easily be held by somebody in such a position that the sitter is shaded from all direct sunlight. Another good scheme is to rig up some kind of a tent arrangement of thin light-coloured material, and to have this between the sun and the sitter. Some of the best snapshot portraits I have ever seen were made with a tent of this kind, the sun being above and a little to one side of the sitter.

In the case of groups it is not quite so easy to arrange for light diffusion, but it is at least possible to ensure that the subjects are not standing in direct sunlight. With small cameras, the view-finders of which are by no means always accurate, care must be taken that the people at the outside of the group are really in the picture. Nothing is more annoying than to find on developing the film that one or more people are shown with only half a body or half a head!

A beautiful picture of two butterflies resting on a flowering shrub. It was taken by Carl W. Beese, Hamilton, Ontario.

One thing is of the utmost importance in all outdoor portraiture, and that is to give a very full exposure. Even a small degree of under-exposure tends to spoil the result, whereas no harm will be done by exposing a little too long. The only way to be sure of good results every time is to use an exposure meter or exposure calculator contained in the Burroughs Wellcome Photographic Handbook.

And now a word about what Tom Sawyer's Aunt Polly called "Animules." Good photographs of family pets make a very strong appeal to those who have to be away from home for long periods, and it is well worth while to take a considerable amount of trouble to get such pictures. The animals concerned will usually be cats or dogs. As a rule, cats do not present much difficulty, provided they are not startled in any way or upset by the presence of people they do not know well. Dogs, on the other hand, are very apt to sense that something unusual is going on, and to work themselves up into a state of great excitement. It is usually best to wait until they have calmed down, and can be persuaded to sit or stand quietly where they are required.



"See, it squeaks like this." A pleasing picture of children at play, by A. Webb, Manchester 18.

In the cockpit of an American Airlines transport during a night flight.

Along American Airlanes

I.—A Night Flight

By Edward T. Myers

IT is a stormy night, with low misty clouds racing across the sky. Somewhere out in the dark a transcontinental aeroplane is winging its way along the thousands of miles of United States airlanes. In the cockpit, amid an array of gauges, are a flight captain and his co-pilot. In the luxurious cabin behind them are 20 passengers and a stewardess, all secure in the thought that their safety is in the hands of two highly trained and experienced pilots. Still 200 miles from their destination, these passengers realise that their machine is as assuredly rushing along its appointed airlane as a railway train below is gliding on its rails.

Almost as certainly as the train control lights tell the locomotive engineer that no other train is on the track ahead, so the radio has given the pilot information of any machines on his course, indicating whether they are above or below his flight level. Thus, although he cannot see into the heavy weather, he may safely push his aircraft forward at 190 m.p.h. Into his earphones comes the steady "on course" signal, a constant tone that tells him that he is on the beam of a radio beacon. If winds should blow his machine off its course, the radio signals will immediately tell him to which side he has drifted; if to the left he will get a dash-dot in the Morse code, and if to the right, a dot-dash.

The weather forecast, which every pilot as well as every flight control official, examines carefully before clearing a flight, showed that conditions at the destination were not good, but indicated that the ceiling would still be above the minimum permitting landings by the time this machine arrived. As a precaution against unexpected bad weather closing an airport, the United States Civil Aeronautics Authority requires that there should be at least one alternative port open and within range of the aircraft's fuel supply. American Airlines give the pilot two alternative ports, so that in case the weather at the destination has grown so bad as to make a landing unsafe, the pilot can fly to one of the others. Naturally it is important that sufficient fuel should be put aboard, and that the pilot should conserve it by not flying too fast.

The weather has been going worse since the take-off several hours back, and the radioed weather report just received by our imaginary pilot states "Ceiling at 'destination' is 500 ft. and falling." The flight captain knew that he would not be allowed to land if the ceiling fell below 400 ft., the minimum permitted for landings at the particular airport, and he began to lay plans for eventualities. Meanwhile he continued to let his machine dash along the airlane. Calculations made by the co-pilot indicated that there was still plenty of fuel for the machine to reach either of the alternative landing fields, where radio reports showed the ceiling to be safely above the minimum.

The flight captain talked over his radio-telephone to the company, asking for instructions. They had been keeping close check on the weather at "destination" and the two alternative ports, and they advised him to continue on his course until further instructions could be given. Meanwhile the flight captain and his co-pilot watched the regular blind flying instruments: the altimeter, to be certain they were above any ground obstructions such as mountain peaks; the compass, to

Passengers boarding one of the machines of American Airlines, Inc., Chicago, by whose courtesy the photographs on this page and the lower one on the next page are reproduced.

check that they were flying towards the radio beacon instead of away from it; the turn and bank indicator, rate of climb gauge, and others. The automatic gyro-pilot was doing most of the actual flying.

In weather as cloudy as this pilots cannot see the airlane marker lamps,

One of the Douglas "Sleeper transports" of Transcontinental and Western Air, Inc., in flight. It has sleeping accommodation for 14 passengers. Photograph by courtesy of Douglas Aircraft Company, U.S.A.

and must fly by instruments. In order to ascertain his position above the ground, our captain instructed the co-pilot to listen for the "fix." A fix is a point where two radio beacons cross each other, and is thus a definite fixed point above the ground. The captain listened for his regular on course signal, and the co-pilot listened to the dot-dash of the "cross-lane" beacon, awaiting the steady signal that would indicate that the machine was crossing the intersection of the two sky lanes. It came, and the time was noted down and also broadcast to the company. As yet a landing would be safe at "destination," and the operating company advised the captain to continue along his present path. Naturally they desired to land the passengers at the regular airport rather than 100 to 200 miles away.

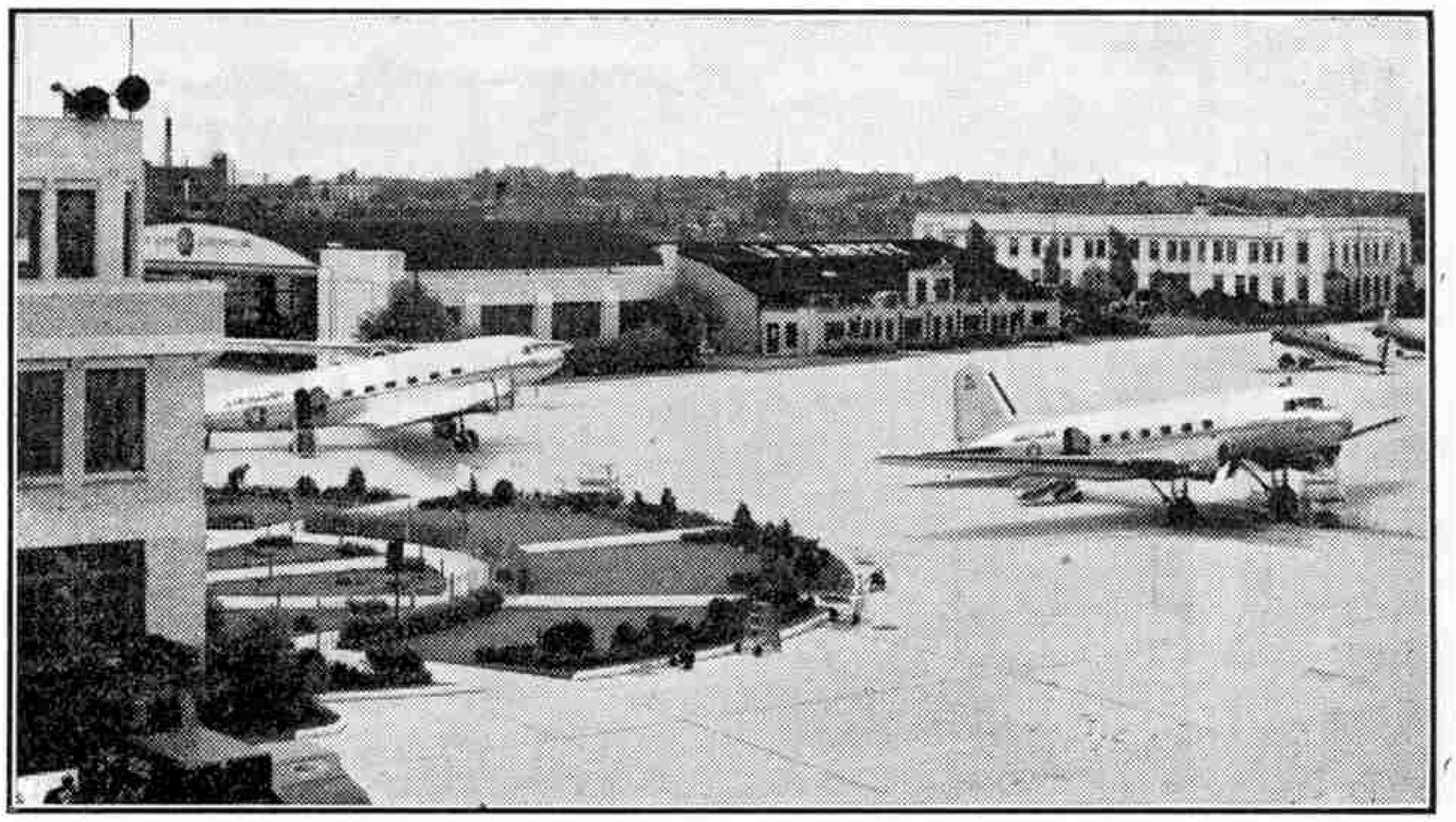
In the main cabin most of the 20 passengers were reading magazines or sleeping, while the stewardess was assuring any uneasy persons. Though the air was a little rougher than usual this night, most of the passengers were completely unaware of the weather difficulties ahead. Only the experienced fliers knew, and they had complete confidence in the pilots and in the modern instruments directing the flight.

By now the machine was approaching the fog-blanketed landing field, and the co-pilot tuned his radio to the frequency allotted the airport control office. Low clouds had reduced the ceiling close to the minimum of 400 ft., but as it was not below this height the control officer directed the machine to come in. If there had been other aircraft landing or approaching he would have let only one land at a time, and kept the others cruising at different altitudes until the field was clear for a landing. In good weather machines may be landed considerably closer than one every 5 min., but in bad weather greater care must be taken by the pilots, and they may even miss the field on the first try. Only two attempts are permitted; then a pilot must take his machine to an alternative port as directed by the official.

Our captain had slackened the aeroplane down to 100 m.p.h., and was listening intently on his radio for the cone of silence that would indicate he was directly over the aerial towers, where no signal can be heard. Knowing that these towers are just two miles from the airport, he would begin his glide down, keeping an eye on his altimeter and rate of climb gauge, which would show how fast he was falling. The steady on course signal ceased for a moment, and the captain knew that this was the cone of silence; but he made a circle to check his position for certainty. Coming over the cone of silence for the last time, he let his machine down through the layers of thick fog. The co-pilot meanwhile dropped the retractable landing wheels, and was ready to let down the flaps that would act as air brakes and slow the aircraft down for a landing at less than 70 m.p.h., hydraulic brakes then actually stopping it. The altimeter continued to fall until it indicated 400 ft. above the ground. The co-pilot was looking out of the window, but he could not see any lights; whereupon the captain opened the throttle and took the machine up again. By radio he contacted the airport. Yes, they had heard him pass. "Try it again," they told him.

A second trial also was unsuccessful, and therefore instructions were issued to the captain to proceed to one of the alternative points of landing. He circled a few times to check his position, and then flew off along the proper leg of the radio beam to the alternative airport, where a safe landing was made. Throughout this last stage of the flight he and the co-pilot, as well as company officials, had kept a close check on his fuel supply, to be certain that he could at all times reach a safe port.

If the air liner and the first airport had been equipped for blind (instrument) landing the pilot could have brought his machine into a safe landing at "destination." Probably some such system will soon be installed at the larger U.S. airports.



A typical American airport scene during a lull in the arrival and departure of aircraft. The main building and control tower are on the left. The twin-engined monoplanes are Douglas air liners.

RAILWAY NEWS

Heavy Work on the Somerset and Dorset Joint Line

Even on wartime schedules some very hard locomotive work is needed over the Somerset and Dorset line, in climbing the precipitous gradients over the Mendips. With a train such as the 9.45 a.m. from Bournemouth, carrying through portions for the north of England, even the Stanier Class "5" 2-cylinder 4–6–0s sometimes require piloting. A maximum of 270 tons is laid down between Evercreech Junction and Radstock, and so on a recent run, details of which have been sent us by Mr. O. S. Nock, when the load was 305 tons tare, and 320 tons with passengers and luggage, No. 5440 had to be assisted on the climb.

From Bournemouth to Evercreech the 4–6–0 had done some interesting work, unpiloted over this length. From Poole, for example, 45 m.p.h. had been attained in 1½ miles of level road, and then speed fell to 26 m.p.h. up the 2 miles at 1 in 75 to Broadstone. On the next two start-to-stop runs, from Broadstone to Blandford and thence to Stalbridge, a number of delays occurred, though smart recoveries from the slacks produced frequent bursts at 55 to 60 m.p.h. over this winding track.

At Stalbridge the engine was remanned, a Bath crew relieving the Bournemouth men, and the run to Wincanton was taken fairly quietly with much reduced speed over the junctions at Templecombe. Then came a very smart run over the 7.1 miles to Evercreech Junction, in 8½ min. start-to-stop with speed touching 63½ m.p.h. at Cole.

At Evercreech Junction Class "2" 4–4–0 No. 696 was waiting to act as pilot, and the two engines were soon pounding their way up the terrific 1 in 50 ascent up the side of the Mendips. The 4½ miles to Shepton Mallet took exactly 13 min. start-to-stop, and although speed fell as low as 18½ m.p.h., the noise of the combined exhausts was enough to show what a task the 4–4–0 and the 4–6–0 together had in hand.

The last 21.9 miles into Bath are booked to be run non-stop in 39 min., and up the last part of the climb the two engines got away well. Speed was higher here, with an average of 22 m.p.h., and the summit, 3.6 miles from Shepton Mallet, was passed in 9½ min. Then came a special stop at Binegar to detach the pilot. The 6.4 miles, of steep descent to Radstock were taken very cautiously, speed rising to 60 m.p.h. once although several times checked drastically for curves. But once through Radstock some capital running was made. On a winding and sharply undulating road speed ranged around 60 m.p.h. and the sharp ascent of nearly 2 miles from Midford Viaduct through Coombe Down tunnel did not bring speed below 45 m.p.h.

So the 10.7 miles from Radstock into Bath were covered in 13¾ min., and the arrival was made in 37¼ min. from Shepton Mallet. This time included 2 min. standing at Binegar, while the pilot engine was detached. As a result of this good work 5 min. of the time lost earlier on the run was regained between Wincanton and Bath.

* * * *

The average speed, start to stop, of goods trains in the United States during 1939 was 62 per cent. greater than in 1920.

A Maidstone West-Paddock Wood Train at East Farleigh. The engine is ex-S.E.C.R. 4-4-0 "D" Class No. 1574. Prize-winning photograph by J. Taylor, Beckenham.

Glasgow Central Station Platforms Lengthened

To permit of the satisfactory handling of the very long trains which are now being run to and from the south consequent on the introduction of more powerful engines, several of the platforms at Glasgow Central Station have recently been lengthened. No. 1 Platform has been extended from 810 ft. to 940 ft. No. 2 Platform from 900 ft. to 1,030 ft. and No. 11 Platform from 816 ft. to 1,170 ft.

No. 11 Platform can now accommodate a train of 17 coaches and two engines. It is one of the longest terminal platforms in Britain, although there are longer through platforms at other stations, notably at Manchester (Victoria), where there is one platform extending to 2,194 ft. in length.

D. S. Barrie.

L.M.S. "War Veteran" Still at Work

Of the 7,644 locomotives in use on the L.M.S. as many as 81 are active service veterans of the last war. These are the survivors of 246 locomotives belonging to constituent companies of the L.M.S. that were sent overseas in the last war for transport duty on the Western Front and elsewhere. Some of these 246 engines did not return from the war, and others have since been withdrawn from traffic.

The 81 surviving engines, which are now doing their bit in essential transport services on the Home Front, comprise 38 that originated on the former London and North Western Railway, 18 of the former Lancashire and Yorkshire Railway, and 25 Scottish locomotives.

S.R. Locomotive Developments

S.R. No. 852 *"Sir Walter Raleigh"* is the third "Lord Nelson" 4–6–0 express engine to be fitted recently with new cylinders, providing improved steam flow, and with larger 10-in. piston valves. The multiple jet blast pipe and wide chimney are now standard fittings on the locomotives of this class, all of which are stationed at Nine Elms, the London shed of the Western Section.

The first two-cylinder "King Arthur" class locomotive to be provided with large blast pipe and chimney has just appeared from Eastleigh works. She is No. 755 *"The Red Knight,"* the last of the 20 4–6–0 express engines designed by Mr. R. W. Urie for the former London and South Western Railway. This class preceded the "King Arthurs" proper by several years, but they are now all grouped together as S.R. class "N15." No. 755 has cylinders 22 in. in diameter, as compared with the standard of 20½ in. for the other "King Arthurs."

The numbers are now placed on the cab side or splasher of tender locomotives, with a neat *"Southern"* only, in new style, in line on the tender. Various shadings of green paint are still being turned out plain, without lining. Engines that are used entirely for goods work are finished in unlined black. The numbers of tank engines now usually appear on the bunker sides.

Rolling Stock Orders in the United States

In January this year 51 steam and 66 electric or Diesel-engined locomotives were on order for principal railways of the United States. For the whole of 1939 the corresponding totals were 100 and 220 respectively.

Over 24,000 new goods vehicles were put in service during 1939, including 12,275 box vans and 10,927 coal wagons. About a quarter of these were built in railway shops.

The up "Coronation Scot" at Brock troughs, Lancashire. This part of the L.M.S. main line was originally the Lancaster and Preston Junction Railway, which was opened in June 1840. Photograph by W. S. Garth, Luton.

Centenary of the Lancaster and Preston Junction Railway

On 25th June 1840 the directors of the Lancaster and Preston Junction Railway made the opening journey from Lancaster to Preston and back, amid the customary celebrations. Thus another link was forged in the growing line of rail communication between London and Scotland by what is now known as the West Coast Route. The 26th of June has also been given as the opening date; probably this was the date on which the public were first allowed to travel on the new railroad.

At the opening of the line the Lancaster station was some distance from the present Castle Station, and to-day the main line diverges from the old one a short distance to the south of Lancaster, at Lancaster Old Junction. The old line now leads to a coal depot, and can be seen on the right as the traveller approaches Lancaster from the south.

Coming south from this point the line skirts the eastern edge of the flat Fylde country, and consequently gradients are easy. The only inclines of note are from Castle Station to Lancaster Old Junction, and a short one into Preston Station.

For most of the way the track is double, except for refuge loops at Oubeck and a four track section between Barton and Broughton, and Greenbank Sidings, Preston.

Traffic of all kinds is heavy, especially in summer, when trains going north to Morecambe and the Lakes, and south to Blackpool and Southport reach large proportions. On a recent journey I noticed several sets of colour-light signals that were being installed between the existing semaphores, presumably as intermediate block sections, to increase the capacity of the line, and these should lead to a very marked improvement in the train working.

There are no great engineering achievements on the line. Probably the best known structure is the graceful Badger bridge, over Brock troughs, which is so called because it bears several emblems of a badger, the coat of arms of the Brockholes family, through whose land the railway passes. It was at this point that the photograph reproduced on this page was taken. This shows *"The Coronation Scot"* on its way southward.

W. S. GARTH.

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The Chicago, Burlington and Quincy Railroad recently put into operation its 10th Diesel-engined "Zephyr," to which the name *"Silver Streak"* has been given.

Heavy Train Loads on L.N.E.R.

Heavy passenger loading has necessitated enormous L.N.E.R. mainline trains weighing over 700 tons. In consequence the L.N.E.R. is now running the morning and afternoon Anglo-Scottish trains in two parts again, at any rate between King's Cross and Newcastle.

Certain trains on the East Coast route have been exceptionally large. On one occasion the up *"Flying Scotsman"* included 22 corridor coaches, of 703 tons tare weight. This great load was exceeded on another occasion by the down 1 p.m. *"Scotsman,"* which had 23 cars. The tare weight was 734 tons, and with passengers and luggage the gross weight probably was about 790 tons. This enormous train was hauled by A4 streamlined "Pacific" No. 2509 *"Silver Link,"* the engine that created a world steam record, averaging 100 m.p.h. over a distance of 43 miles.

Another L.N.E.R. "A3" Pacific

L.N.E.R. No. 2566 *"Ladas,"* one of the original 1923 4–6–2 express engines with boiler pressure of 180 lb. per sq. in. stationed in the Scottish area, has been rebuilt with a boiler pressed to 220 lb. per sq. in., thus converting her from the "A1" to the "A3" class. It is 12 years since any such reboilering has taken place.

Five "A1" locomotives were equipped as "super-Pacifics" in 1927 as an experiment. This led to the construction in the following years of 27 "A3" class engines.

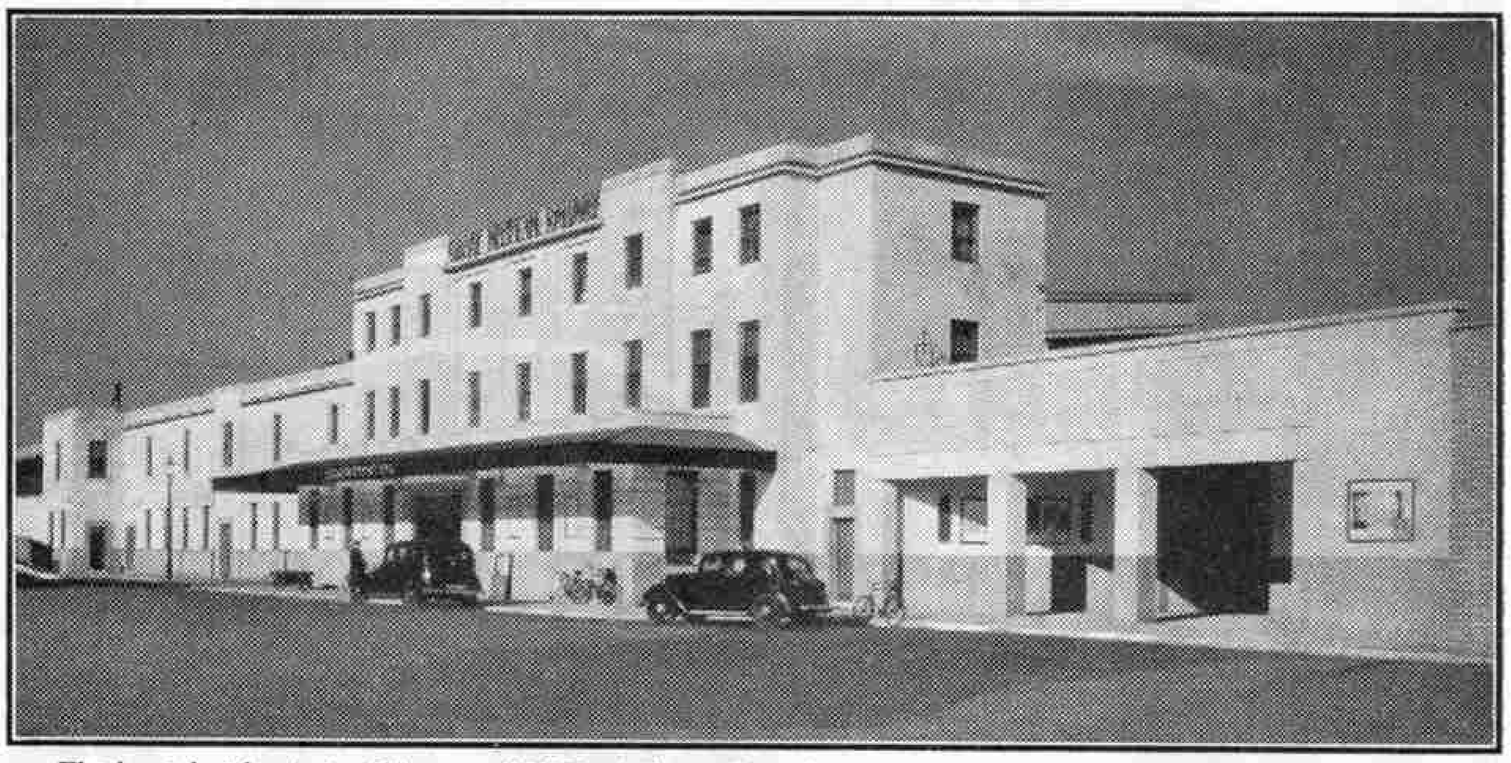
Wartime Running on the L.M.S.

On a recent journey by the 12.20 p.m. Bradford to St. Pancras, "Jubilee" 4–6–0 No. 5639 *"Raleigh"* took a load of 400 tons tare, 420 tons gross, from Nottingham to London, and had no difficulty in regaining the whole of an 8 min. late start, although the driver paid careful regard to the permitted maximum. Out of Nottingham, speed was maintained at between 42 and 47 m.p.h. up to the initial 10½ miles ascent, mostly at 1 in 200, to Upper Broughton, and the 18.2 miles to the stop at Melton Mowbray were completed in 26 min., one min. less than schedule. Somewhat similar speeds were maintained up the 19.6 miles from Bedford to Luton, which section was run in 28½ min. start-to-stop, or half a minute under time, but the best gains on schedule were 3½ min. in the 15.2 miles from Wellingborough to Bedford, run in 20½ min., and 2½ min. on the final 30.2 miles from Luton into St. Pancras, covered in 36½ min. Other features of interest connected with passenger working on the Midland Division include the rostering of loads approaching 495 tons with certain West to North relief trains; the working of most of the St. Pancras–Manchester expresses via Trent North Curve, which is little used by passenger trains in peacetime, and the routing of the 10 a.m. St. Pancras to Scotland express via Derby. Incidentally the minimum formation of this train south of Sheffield is 342 tons.

On the Western Division, a run on the 8.30 a.m. Liverpool and Manchester combined train, with a 17-coach load of 512 tons behind Stanier 4–6–2 No. 6211 *"Queen Maud"* yielded start-to-stop averages of 50.2 m.p.h. from Euston to Rugby, and 50 m.p.h. from there to Stafford, inclusive of a severe permanent way slowing in each case. With the 2.15 p.m. Manchester to Euston express, which travels via the Potteries, "Patriot" 4–6–0 No. 5536 *"Private W. Wood, V.C."* hauling a 14-coach train of 425–450 tons, covered the 63.3 miles from Stoke to Rugby, inclusive of a bad permanent way check, in 73 min. at an average speed of 52 m.p.h., thus regaining 4 min. on schedule.

The maximum loading of any L.M.S. passenger train under present conditions is 600 tons, and normally not more than 17 bogie vehicles may be run on any train, one of the objects of such limitation being to prevent the loss of time that would ensure at stations if "drawing up" were necessary.

D. S. BARRIE.



The imposing frontage of the new G.W.R. station at Leamington Spa. Photograph by courtesy of the G.W.R.

Story of Tin

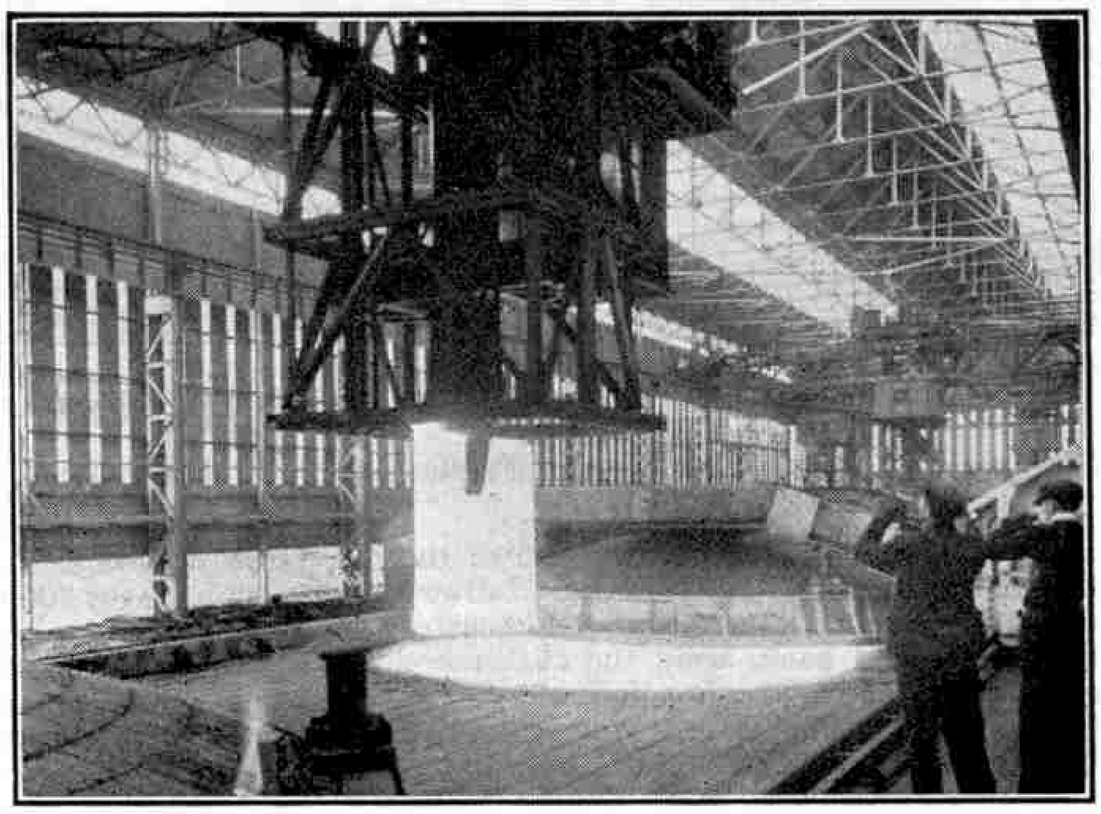
II—How Tinplate is Made

LAST month the mining of tin from prehistoric days in Cornwall and its production in Malaya at the present time were fully explained. Now we come to the many uses that have been found for this valuable white metal. Tin began its service in the bronze age. Bronze is an alloy of tin and copper, and is harder than either of the metals of which it is formed. It can readily be worked, and was used in prehistoric times for swords, axes, arrow-heads and other weapons and tools.

The bronze age has now given way to that of iron and steel, but the alloy is still invaluable. For instance, it is used in making big bells, to which it gives a very rich tone; and special bronzes containing other constituents are very largely employed in industry. A very striking example is phosphor bronze, an alloy to which special hardness is given by the presence of a small proportion of phosphorus, so that it is particularly suitable for making bearings required to stand up to hard and prolonged wear. Other alloys containing tin are pewter and the various solders, in which the metal is alloyed with various proportions of lead.

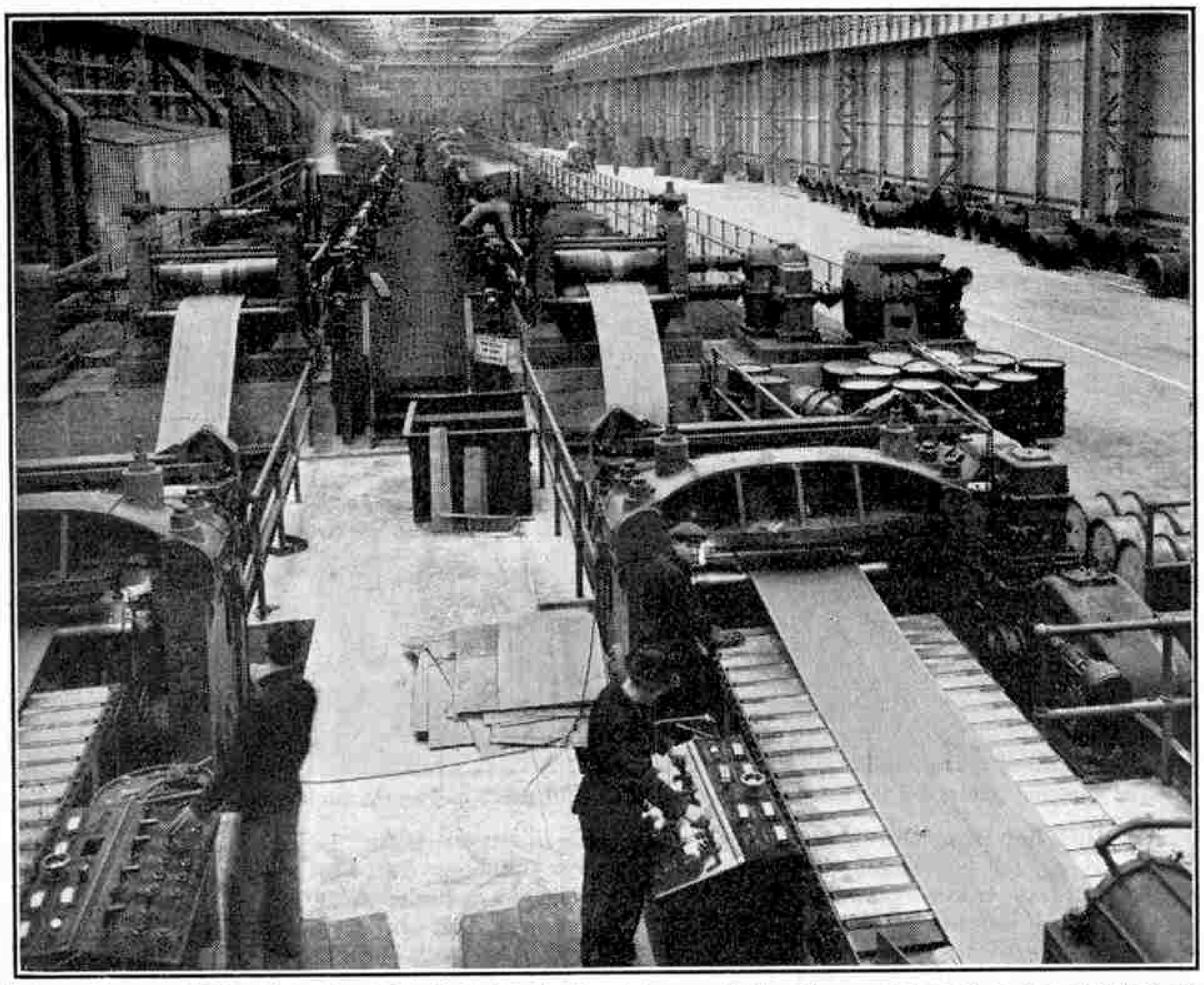
One of the most valuable features of tin is that it does not rust or tarnish easily. This has led to its use as a wrapping, and tin foil, in which the metal is rolled out to an extraordinary thinness, is one of the most familiar wrappings in use to-day.

Tin is used as a protective coating for iron and steel. It is this application that accounts for the high regard in which the metal is held to-day, for the greater part of the world's output is used in the tinplate industry. The principle is simple. A bright sheet of mild steel is dipped into molten tin, when a thin film of this metal adheres to it to form the protective coating. The manufacture of tinplate is carried on on such an enormous scale and with so much care and precision that a modern tinplate works is one of the most fascinating industrial plants in existence.



Lifting an ingot of steel from a soaking pit. We are indebted to Richard Thomas and Co. Ltd., Ebbw Vale, for the illustrations to this article.

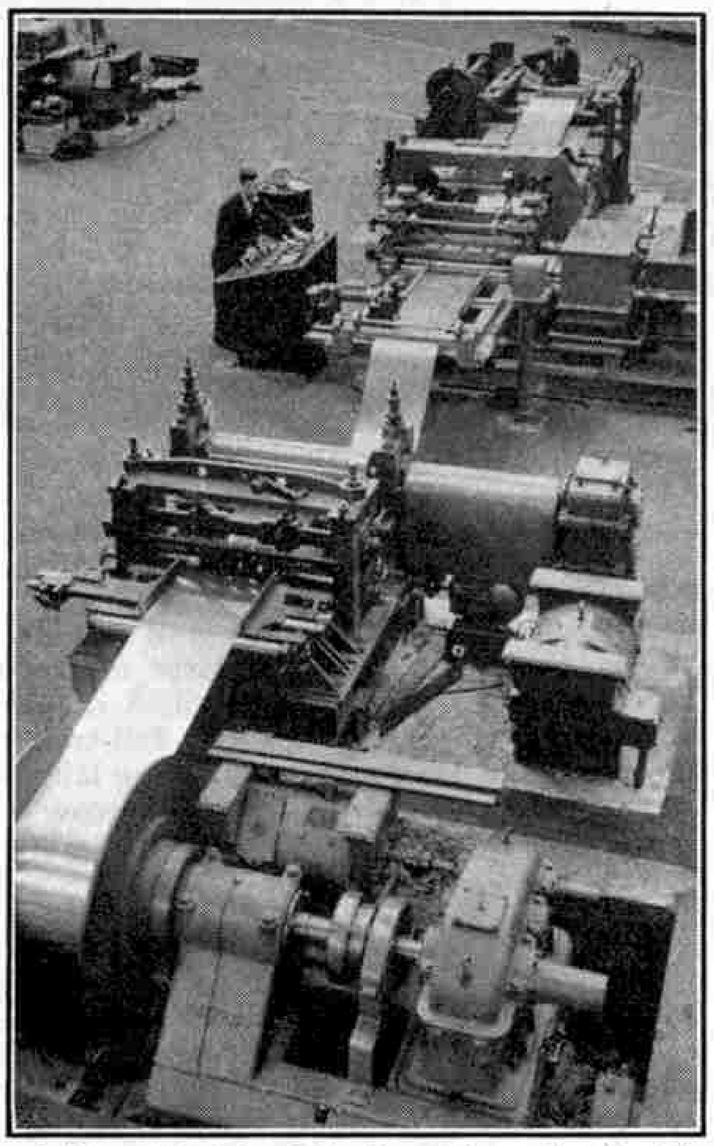
The great home of the tinplate industry in Great Britain is South Wales, and in recent years a giant continuous strip mill has been built in Ebbw Vale for Richard Thomas and Co. Ltd. This huge plant is designed for a yearly output of 600,000 tons of finished and semi-finished products, including tinplate, and is completely self-contained. It includes blast furnaces of 500-ton capacity for the production of pig-iron from Northamptonshire iron ore, and a coke-producing plant with a battery of ovens that handle about 1,370 tons of coal a day. The coal comes from pits in South Wales, and limestone, which is required in the blast furnaces, is quarried about seven miles away. Pig-iron from the blast furnaces is used to feed open-hearth furnaces and Bessemer converters in the steel works, which have a total capacity of about 39,000 tons a month of ingots varying in weight up to a maximum of 10 tons.



Two continuous pickling lines, in which steel strip for tin-plate manufacture is passed through a cleansing bath of dilute acid. The two lines are capable of dealing with 35,000 tons of steel a month.

Steel ingots form the starting point of the production of tinplate. When they have been poured they are taken to soaking pits heated by producer gas or oil, and from there are carried by an overhead crane to the blooming mill, where they are rolled into slabs and cut to size. The slabs may proceed to the roughing mill, for conversion into the strip from which tinplate is made, or may be stored until they are wanted. Cold slabs to be rolled are first reheated in gigantic furnaces, through which they are pushed in either a single or a double row by means of an electrically operated double-head pusher.

Whether they come from the blooming mill or the furnace, the white hot slabs go to what is called the hot strip mill, in which they pass through giant rolls exerting enormous pressure. The first unit is a scale breaker. In this the rolls press lightly on the slabs, on which water at a pressure of 1,000 lb. per sq. in. is sprayed in order to wash away the scale of oxide loosened by the rolling. Then comes the squeezer, which squares up the slabs and gives them the exact width required before they pass on to the roughing stands, consisting of three sets of two rolls each, and a fourth in which there are four rolls. The rolls of the roughing mill are of enormous size. All are 56 in. long and those of the first three stands are 32 in. in diameter, while the fourth has working rolls of 21 in. diameter and back-up rolls, that is rolls that take up the pressure and support the slabs at this stage, of 46 in. diameter. They are electrically-driven, as are all the rolls in the plant, and their



Cutting strip into plates in readiness for tinning.

motors are of 2,500 h.p.

The slabs are considerably reduced in thickness as they pass through the rolls, and therefore are stretched out. This increase in length is allowed for by placing the stands at successively greater distances from each other. Thus the first is 25 ft. 10 in. from the squeezer, but the next two intervals are 39 ft. 1 in. and 51 ft. 11 in. respectively, while the last of the four roughing rolls is placed 83 ft. 1 in. away from the third. The pace of the slabs also has to be increased in order to keep them moving smoothly in procession as they increase in length, and this is brought about by driving the rolls of successive stands at higher speed. The rolls of the first two roughing stands rotate at a speed of 25 r.p.m., but those of the fourth turn more than three times as fast.

The slab of metal has now become stretched out into a strip, and this is rolled out in the finishing mill, which reduces its thickness further. Again a scale breaker begins the operations, after which the metal passes through five stands of finishing rolls, each of which moves faster than its predecessor. The final rolls can be turned at the high rate of 336 r.p.m., and strip is delivered from them at speeds up to a maximum of 1,850 ft. per min. The speed of the rolls must be exactly controlled throughout this process in order to keep the strips moving smoothly, and the necessary adjustments are made from a switchboard.

The giant plant that converts ingots into strip has a monthly capacity of 50,000 tons. The metal that issues from it has an average thickness of .078 in., and is either coiled or cut into sheets. For the tin-plate plant the metal is coiled, and the next step is to "pickle" the strip, that is, to dip it into dilute sulphuric acid. The coils are carried to the pickling department by a chain conveyor, and there are passed through one of two duplicate pickling lines, in which the process is continuous. The strip is uncoiled, and run in succession through tanks containing dilute sulphuric acid and water. These tanks are built up of steel plate lined with rubber and acid resisting brick. They are of enormous size. The acid tanks are 61 ft. long and 4 ft. deep, and hold about 6,000 gallons each, while the water tanks have a capacity of 3,000 gallons. The strip runs through them at speeds ranging from 42 to 168 ft. per min., and the acid, which is heated to a temperature of 175 to 200 deg. F. by steam jets, removes the impurities on its surface and gives a perfectly clean metallic appearance.

When the strip emerges from the pickling plant it is again coiled, and tractors then carry the coils to the tinplate cold reduction mill. There the strip passes through five stands that reduce the thickness of the metal from a maximum of 90 thousandths of an inch to only six thousandths. Enormous pressures are exerted by the rolls of these stands, the last of which is driven by a 1,000 h.p. motor, and each set of rolls in turn moves at a higher rate than the one before it. The maximum speed of the fifth and last roll is 224 r.p.m., and at this rate 1,120 ft. of strip leave the cold mill every minute. Electric micrometers gauge the thickness of the rolled strip continuously, so that a check is kept on the work of the rolls. The micrometers can detect errors of a few thousandths of an inch, although they may be placed 10 ft. away from the strip itself.

Cooling water is applied to the rolls of this mill in order to keep them of the correct shape. They are clean and bright, and are perfectly smooth. Palm oil also is applied to the strip to improve the surface and to help in the rolling process. Both liquids are applied through specially designed spray nozzles.

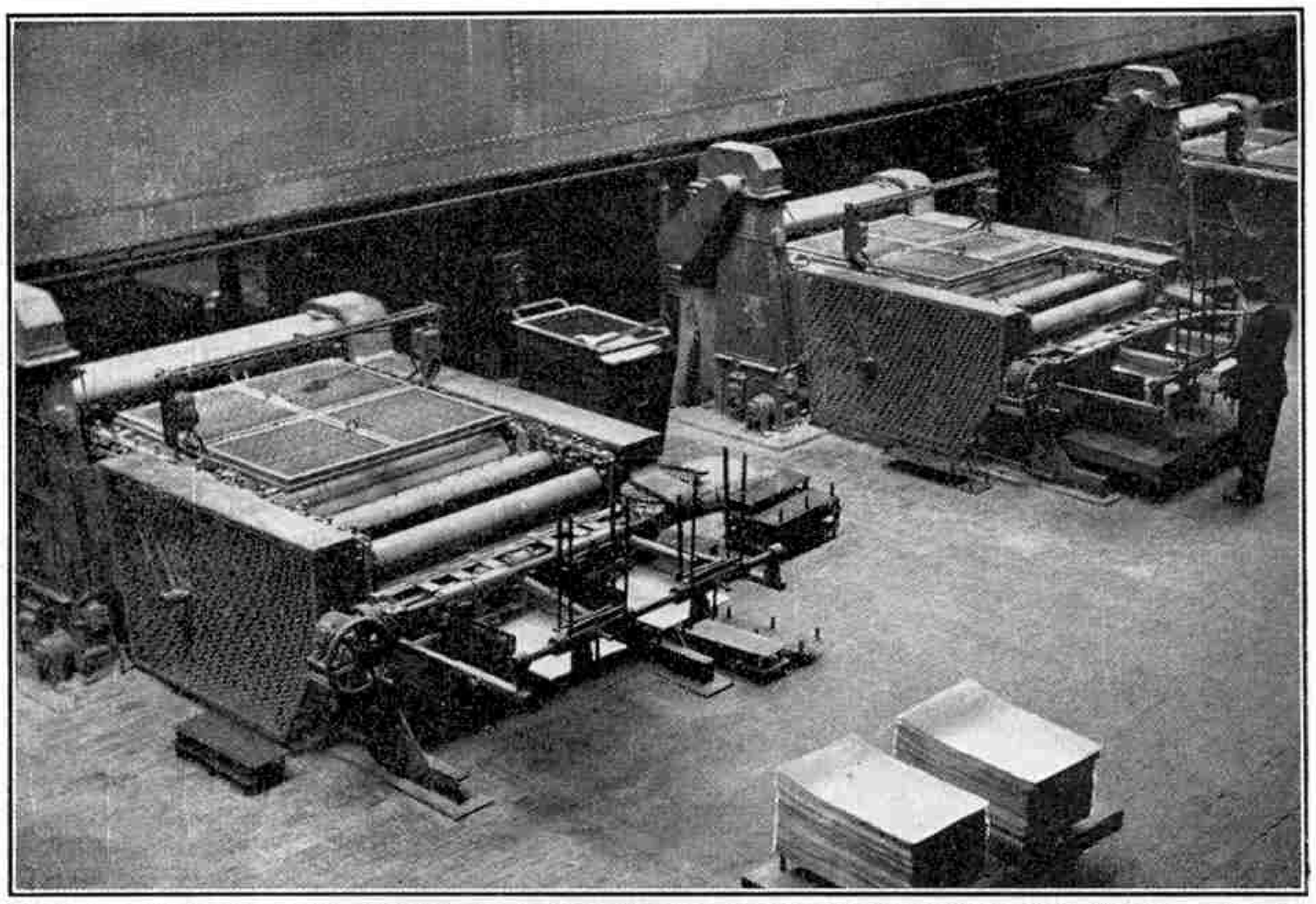
Another cleaning process follows, and for this the adjacent ends of successive coils are welded together electrically to form one gigantic continuous strip that passes in turn through water, an electrolytic cleaning tank, a scrubber and a dryer. The electrolytic cleaning tank contains a solution of caustic soda that is heated by steam. The strip is now hard and springy, owing to the enormous pressure that has been exerted upon it in the cold reduction mill, and it is therefore annealed by heating. This is done under a portable cover and during the process the metal is kept out of contact with the air by circulating over it a gas that prevents the formation of oxide. After this, the coils are passed through temper mills.

The next step is to cut the coils into sheets ready for tinning. The cutting, trimming and storing of the sheets is carried out automatically, and the finished sheets are piled mechanically in readiness for transport to the tinning plant.

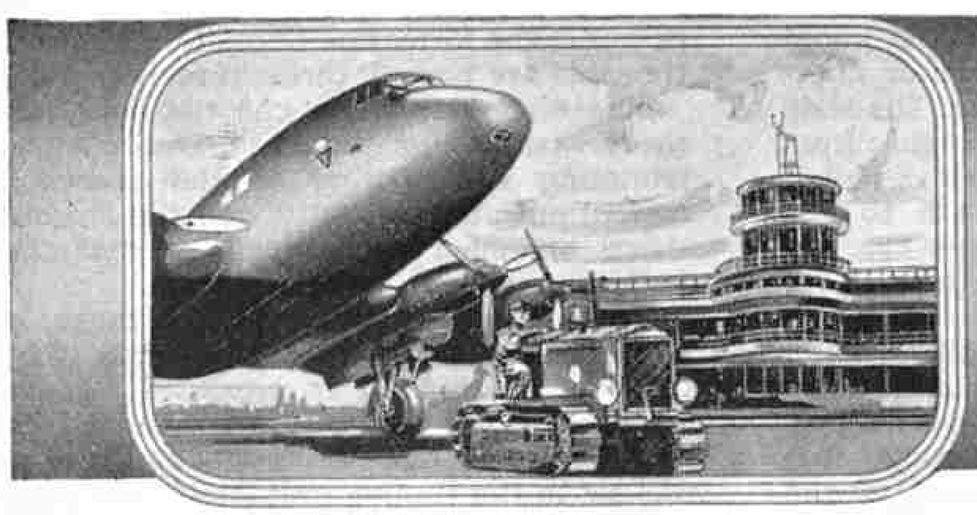
The plates for tinning may range in length from 18 in. to 40 in., and from 12 in. to 36 in. in width. Two processes actually are used in the South Wales plant we are describing. In one of these the plate is pickled in the tinning unit itself. The plate is automatically fed and continuously pickled, scrubbed, tinned, cleaned and piled. The central feature of the process is the passage of the plates through pots containing palm oil and melted tin. In many tinning plants the tin and palm oil are in one tank, divided into two portions inter-connected at the bottom, but in the Ebbw Vale works separate pots are used. The tin is heated to 550 deg. F., and as the clean metal sheets are passed through the molten metal a thin coating of this adheres to them, the surplus metal draining back as the plates emerge. The thin coating rapidly becomes solid, and the oiling of the plates ensures an even coating. The sheets then pass between rolls that rub the metal over lightly with sawdust or some similar material in order to clean it.

Tractors carry the tinplate to a sorting room and on into the warehouse. In both these departments the temperature is automatically controlled. Squaring shears and slitters are installed for final processing, and the tinplate is then packed ready for shipment.

Millions of flat sheets of bright tinplate produced in this manner are converted into containers for food and articles of many different kinds. Can making is one of the supreme examples of mass production, with machines arranged in lines so that the processes are continuous and speedy. The coating of tin given to the steel, although this is exceedingly thin, prevents corrosion, and cans of food opened 20 years after being packed have been found unimpaired. Tobacco, cigarettes and sweets also can be stored in cans for many years.



Tinning machines at the Ebbw Vale Works. In these the steel plates are passed automatically through molten tin, which forms a thin even coating on them.



AIR NEWS

Musick Memorial Trophy Award

The Musick Memorial Trophy for 1940 has been awarded to Robert J. Minshall, vice-president in charge of engineering, Boeing Aircraft Company, U.S.A., in respect of "major" engineering improvements in large flying boats. Minshall directed the engineering of the 74-seater Boeing 314 "Clippers" built for Pan American Airways' transatlantic and transpacific air services.

The Musick Trophy was introduced in 1938, in memory of Capt. E. Musick and six companions who lost their lives that year while pioneering a new air route from the United States to New Zealand. It is awarded yearly by a committee representing New Zealand, the Royal Aeronautical Society of Great Britain, and the Institute of Aeronautical Sciences for the United States, to the person considered to have made the most valuable contribution toward the safety of life in the air, with special regard to transoceanic flying. Minshall is the first American to receive the trophy.

"Vetting" the R.A.F. "Sunderlands"

The four-engined "Sunderland" flying boats of the R.A.F. Coastal Command have been flying a million miles a month, in all weathers. Although primarily intended for scouting and reconnaissance these boats are powerfully armed and ready for any emergency. In April last one of them was attacked by six Junkers Ju 88s, the latest type of German long-range bomber, and not only shot her way clear but in the process destroyed two of the enemy machines. The pilot of the flying boat, Flt. Lieut. Frank Phillips, has been awarded the D.F.C., and his rear gunner, Cpl. W. G. Lillie, the D.F.M., for this courageous action.

Every "Sunderland" is completely overhauled after each period of 180 hr. in the air, and there are minor overhauls at intervals of 30 hrs.' flying. The photograph on this page shows one of these 20-ton boats being towed stern first up a slipway for overhaul.

Men in waterproof suits wade out to the flying boat and make fast ropes and wires to hold her. "Legs" almost twice as high as a man are then attached to her, and they form the beaching chassis on which she stands when she has been towed on to the cradle and manœuvred into the hangar. There a maintenance party dismember the "Sunderland," and soon she is just an empty shell—the centre of a scene of orderly litter.

The great hull, half as long again as a cricket pitch, is inspected, and any corrosion or marine growths are scraped off. Inspection patches at various places along the main planes are removed, and careful search is made for corrosion that might weaken the structure. Any affected parts are scraped, and if the damage is only slight they are re-painted. Worn parts in the engines are renewed, and any loose rivets are replaced. Every item of the boat's equipment also is checked.

At last the "Sunderland" goes down to the water again, and 2 hr. later her own crew have her ready for patrol. A dinghy then tows away the legs and tail-trolley on which she has stood, a refuelling launch passes hoses aboard, and a bomb scow or dinghy feels its way beneath the wings to give the flying boat her "teeth."

A "Sunderland" flying boat of the R.A.F. Coastal Command being towed up a slipway for overhaul. Aircraft of this type have been co-operating with the Royal Navy in escorting convoys of merchant ships.

Air Services to Lisbon

It is expected that the British air service to Lisbon will be introduced soon after the landplane organisation of British Overseas Airways Corporation have completed the removal from Heston to Gatwick airport. The service will provide a much-needed connection with Pan American Airways transatlantic service which, during the war terminates at Lisbon. A series of survey flights over the proposed British air route to that capital has been carried out this spring by the Corporation's "Frobisher" air liners.

The "*Corsair*" Back in Service

A remarkable salvage feat has resulted in a British flying boat returning to service a year after it was "lost" somewhere in Africa. On 14th March last year the Empire flying boat "*Corsair*" got off her course when flying across Africa from Port Bell, Lake Victoria, to Juba. The pilot made a skilful landing on a narrow river in the heart of the Belgian Congo, but unfortunately as the boat taxied to rest the hull struck some submerged object and was fractured. Repairing the damage and clearing the river to enable the boat to take-off took four months. Then a more serious mishap occurred. In attempting to take-off for the flight back to England "*Corsair*" struck a submerged rock and sank. It took a further six months to salvage and repair the boat, and it was necessary to dam the river so as to raise the water level for the take-off.

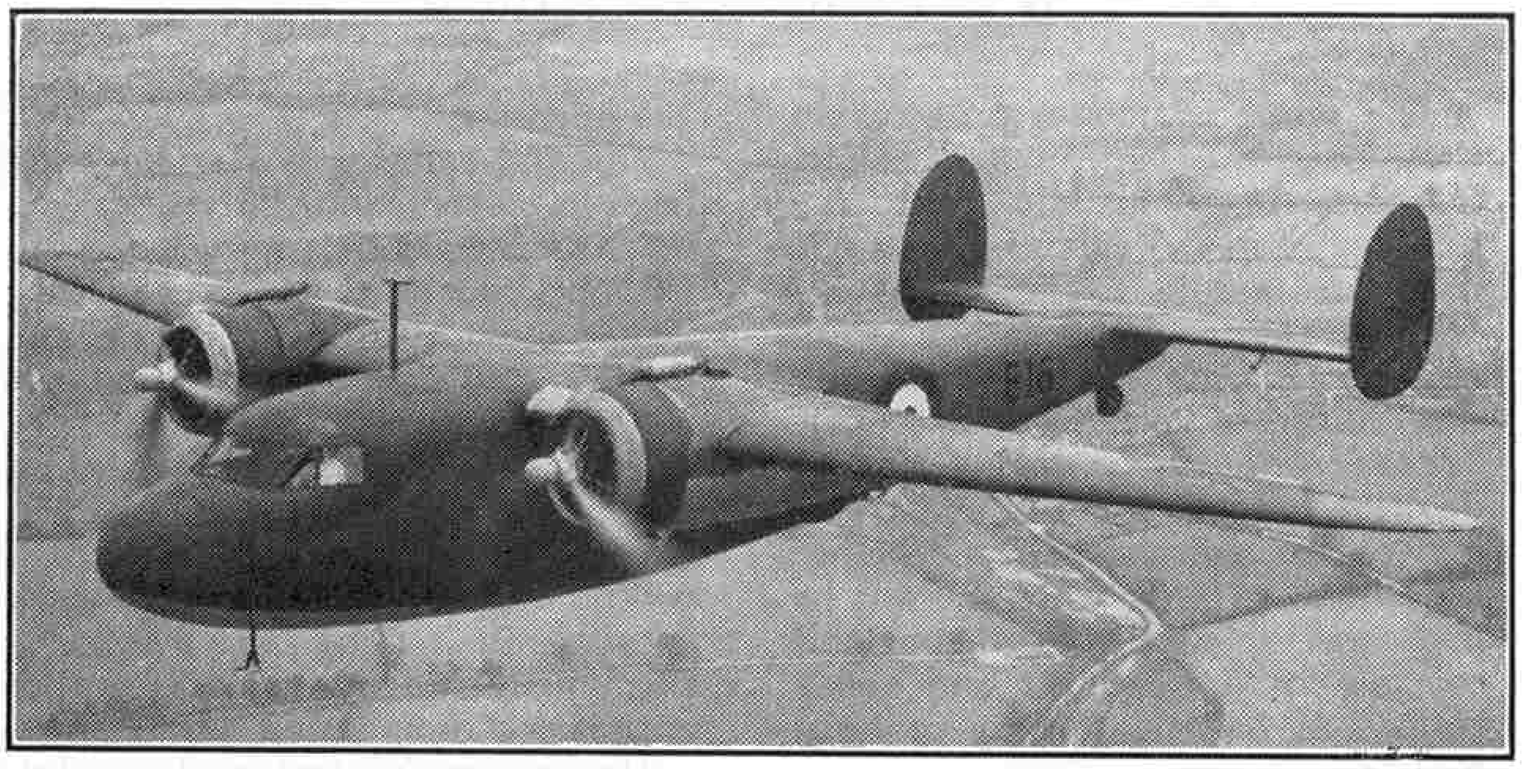
At last everything was ready for a second attempt, and this time the great four-engined flying boat, stripped down to an all-up weight of about 13½ tons, succeeded in leaving the narrow tropical river which had held her prisoner for 10 months. She landed safely in England two days later. Since then "*Corsair*" has been reconditioned and overhauled, and early in April last she re-entered the Empire air service on the Australian run.

Pan American Airway's Plans

Pan American Airways intend to inaugurate a landplane service between San Francisco and Honolulu in 1942. It will be operated with Lockheed "Excalibur" air liners now on order, and these aircraft are expected to accomplish the transpacific flight in about 9 hr. The "Excalibur" is a four-engined monoplane with a range of about 2,500 miles, and the cruising speed is given as 262 m.p.h.

An Anxious Moment

Prompt action recently by an anti-aircraft gunner probably saved the crew of an R.A.F. "Blenheim" from being killed or seriously injured.



One of the latest D.H. "Flamingo" transport monoplanes. It has a top speed of 239 m.p.h. Photographs on this page are by courtesy of "The Aeroplane."

The aircraft was flying at about 2,000 ft. and as it passed over an anti-aircraft gun site several miles from an R.A.F. station in the South of England, a gunner at the site noticed that one of the machine's under-carriage wheels was hanging down. He at once telephoned to the R.A.F. station, and from there a wireless message was sent to the Sergeant-pilot of the "Blenheim," warning him of his danger.

The station fire engine and an ambulance were rushed on to the landing ground in readiness for a crash. When eventually the "Blenheim" appeared over the aerodrome, an officer on the ground gave instructions by wireless-telephone to the pilot. "Dive at high speed and pull out quickly," he advised him, as it was hoped that this manœuvre would release the whole under-carriage. Four or five times the pilot swooped over the station, while the ground staff watched anxiously. Then with a sigh of relief they saw that the undercarriage had come down, and a few minutes later the pilot made a safe landing.

Flaming Onions: Old and New

R.A.F. pilots returned from flights over Germany frequently report that they have encountered "flaming onions." These "onions" are very different from those of the last war. The 1914–18 type was a star shell. The stars varied in number and were expelled from a shrapnel case, and they hung about in the air for a considerable time. They were intended to set fire to the fabric of the old type aircraft, but actually did very little damage. The Germans called them "leuchtkaninchen," or light rabbits.

The modern version of the "flaming onion" is a light anti-aircraft tracer shell fitted with a self-destroying fuse in addition to the percussion one. If the shell hits an aircraft it explodes with the usual effect, but if it misses the target the self-destroying fuse is fired by the tracer. This fuse is fitted into the base of the shell and explodes the charge so that the shell will not injure people on the ground.

As the light A.A. guns fire as many as 150 rounds a minute, a stream of shells exploded by their self-destroying fuses looks as though the shells are tied together and they resemble the old-type "flaming onions."

Air Traffic to Eire

The remarkable growth in air travel between this country and Eire is shown by the latest traffic figures. During the five months 23rd October 1939 to 31st March this year a total of 2,893 people were carried on the Dublin–Liverpool service of Aer Lingus Teoranta. During the same period in 1938–9 the total number of passengers flown by the company on the Dublin–Bristol–London service then operated was 760. Aer Lingus Teoranta employ D.H. 86B "Express" and Lockheed 14 air liners, but it is reported that the latest addition to the fleet is a Douglas machine.

* * * *

Bristol "Blenheims" of the R.A.F. were in the news again recently when they took part in highly successful raids upon Norwegian aerodromes captured by the Germans. A splendid miniature of this famous type of British bomber is now included in the Dinky Toys series, and is referred to in the advertisement on page v.

Longer Sea Patrols

One of the busiest reconnaissance Squadrons of the Royal Air Force is breaking its own flying-time records every week. This Squadron keeps pace with the increasing hours of daylight. From dawn until nightfall its aircraft sweep the waters, hunting U-boats, inspecting shipping, and directing rescue craft to shipwrecked seamen. Every lengthening day gives more flying time. Every shortening night brings greater hazards to the U-boats, which need the cover of darkness to recharge their batteries on the surface.

The area patrolled, nearly all of it over the sea, has some of the worst weather around the British Isles, and the crews have to fight tremendous gales. In one recent storm an aircraft flying against a headwind took 3 hr. to reach the limit of its patrol, but with a following wind it came back the same distance in 55 min.

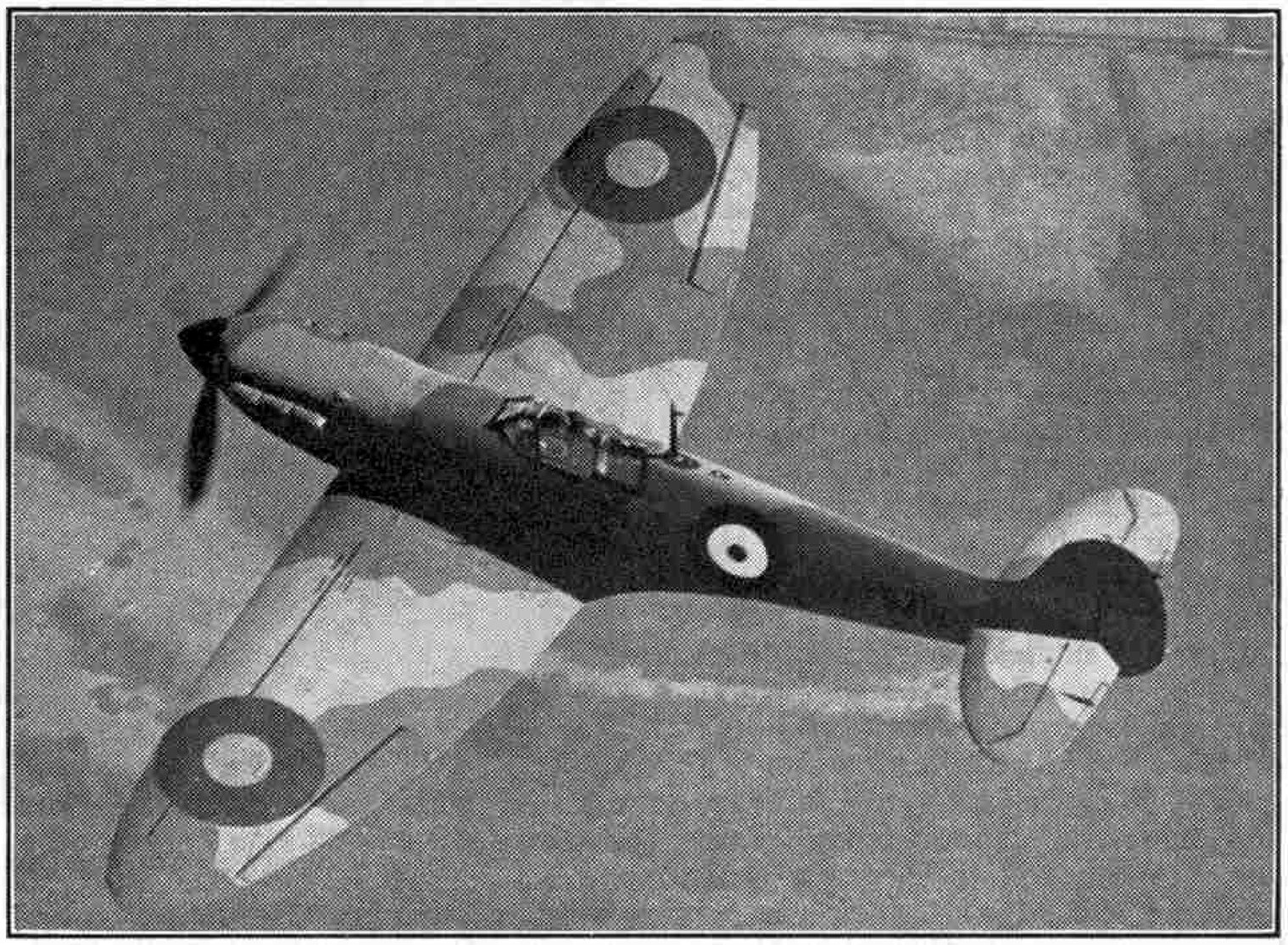
Sometimes salt is whipped from the sea-spray and carried hundreds of feet into the air, where it becomes encrusted on the windows of the aircraft. To the men inside it seems as if they are flying in thick mist, until a rainstorm ploughs lines through the deposit and partly clears the windows. In those latitudes ice-forming conditions are frequently encountered.

* * * *

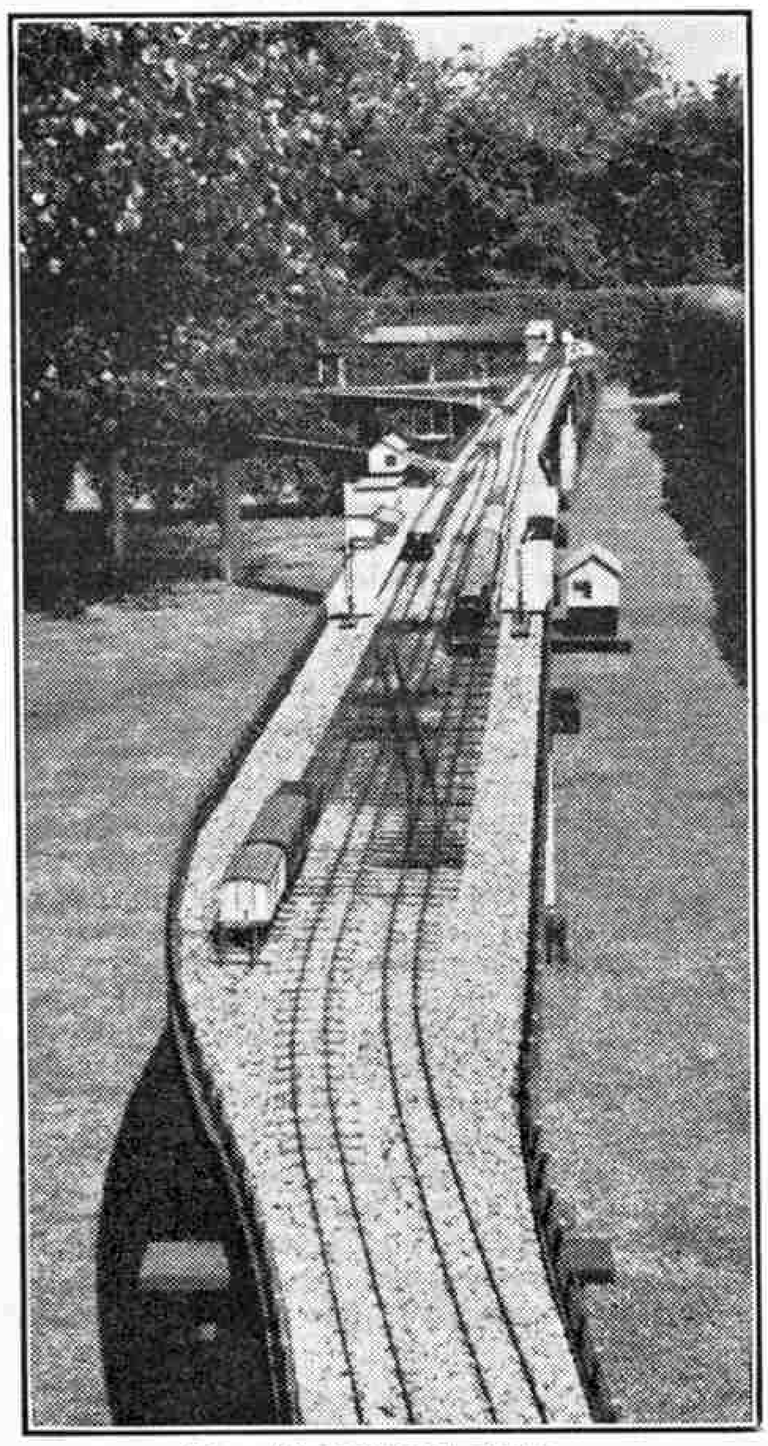
Another Empire flying boat has been delivered to British Overseas Airways Corporation. It has been named *"Clifton."* The Empire flying boat delivered to Imperial Airways last year and named by them *"Australia"* has been renamed *"Clare."*

Good Work by a D.H. 86 Air Liner

Recently Airlines of Australia chartered from Qantas Empire Airways one of that company's D.H. 86 air liners normally used on the Brisbane–Cloncurry section. Airlines employed the machine on the Brisbane–Sydney landplane air service, and during 80 consecutive days it flew a total of 76,000 miles. Throughout this period 100 per cent. regularity was maintained.



An interesting view of a Vickers-Supermarine "Spitfire" single-seater fighter of the R.A.F., a type that has proved its superiority in many engagements with enemy aircraft.



"Lone Pine" through station.

A Railway in a Garden

By W. J. Bassett-Lowke, M.I.Loco.E.

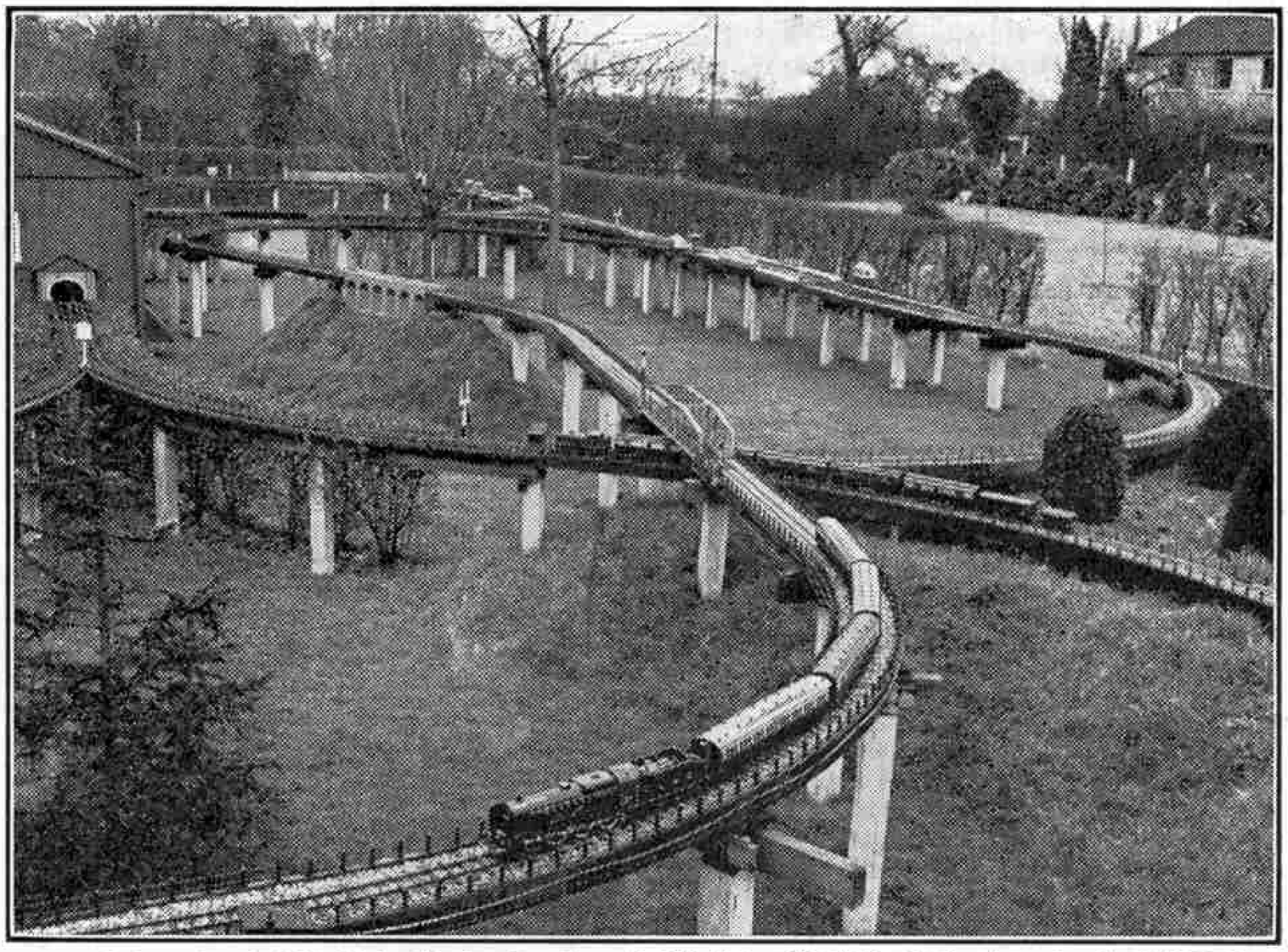
MODEL railwaymen have different ideas and motives in the development of their hobby. Some find interest in running a railway from commercially-made models, satisfying themselves with the laying of their own track and the construction of station buildings and wayside equipment. Some choose purely the running or efficiency side of the locomotives themselves, whether electrically or steam driven, while others go for "scale" above all. A fourth category prefer general scale appearance of layout, particularly accessories and scenic effects.

I mention all these four phases of the model railway hobby because I happen to know a remarkable man who has been successful in combining nearly all of them. He is Mr. Victor Harrison of Bishop's Stortford, first known among model men as a builder of model steamers, but of later years much in the public eye as a model railroad owner. He tells me that as a boy he was the possessor of a gauge "0" clockwork model railway, laid on boards supported by "Tate Cube" sugar boxes! The rails were tinplate, and all the stock was of German origin, as in those days there were no English models available. The scope of model railways in those days was very limited, so Mr. Harrison turned his energies to the building of model steamers, and not until his middle twenties was his dormant interest in his earlier hobby roused. His friend Henry Greenly was editor of a new little paper, "*Model Railways*," which began to describe new methods of constructing wagons and coaches; and before Mr. Harrison knew where he was he had constructed all the wagons and coaches for a passenger and goods train, but had no railway or locomotives.

It was difficult at that time to decide upon a gauge to adopt, as model railways were really in their infancy. The choice then was between $2\frac{1}{2}$ in. gauge (then known as gauge 3), gauge 2, or gauge 1 ($1\frac{3}{4}$ in. between the rails). This, you will notice, was before gauge "0" had come into the picture, and Mr. Harrison decided on gauge 1, which in 1911 was becoming very popular. He was essentially a steam model locomotive enthusiast, and there were no gauge "0" steam locomotives then except externally fired ones, which are not successful in the open air.

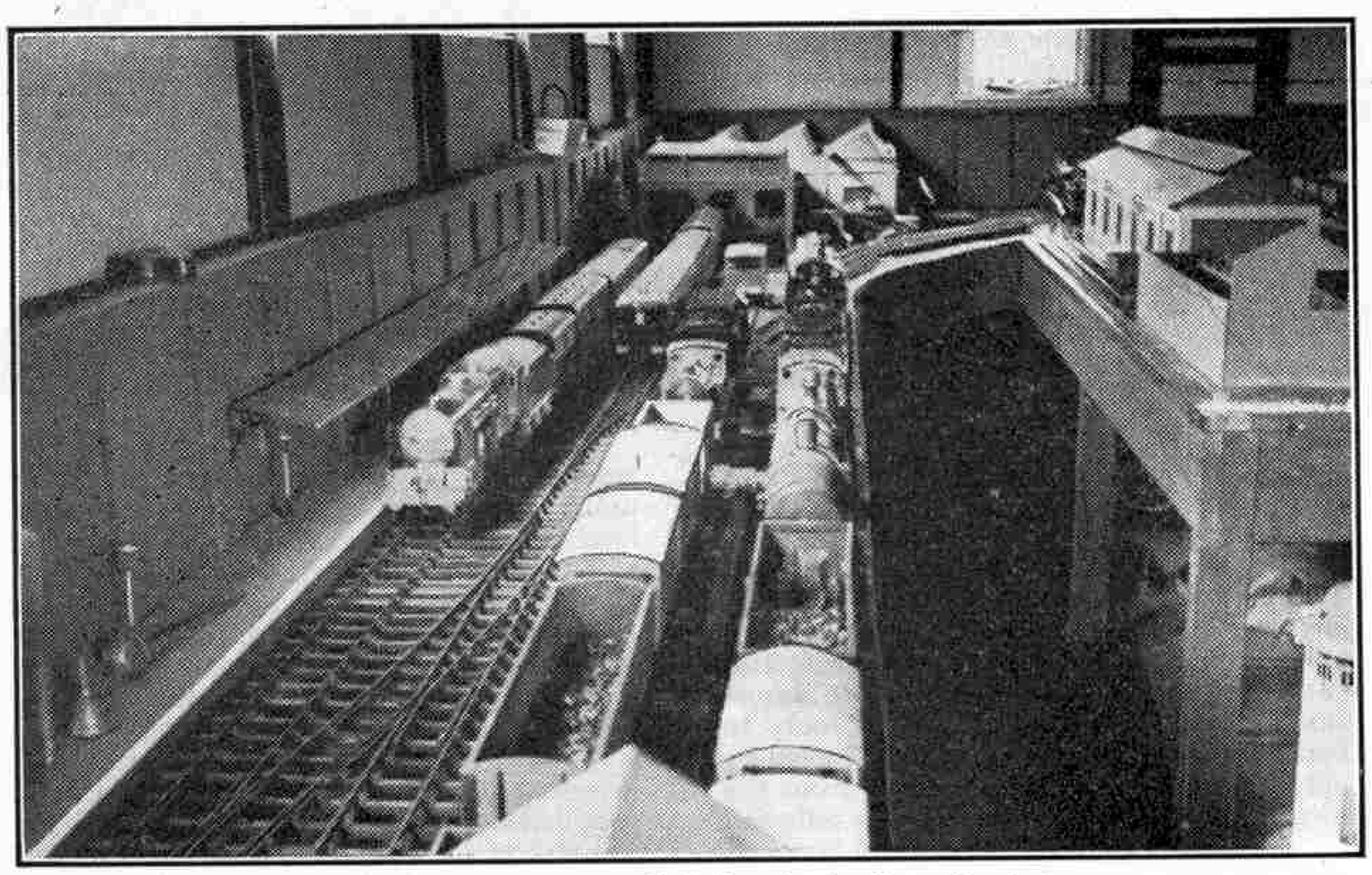
His first railway at Hertford had been in existence for 25 years when in February 1932 he moved to Bishop's Stortford. He says of this: "The moving of my workshop, models, and last but not least the model railway, was a nightmare. The railway was elevated on posts, on the principle advocated by Mr. George Winteringham. Model men will be well able to imagine the work entailed in pulling up 300 ft. of permanent way and points, together with wood foundation posts, etc."

He has an eye for the beautiful, and his railway, although it is spread over the picturesque Bishop's Stortford garden, in no way detracts from the surroundings. He had to plan quickly on arrival at his new home, for it was essential to erect his railway immediately; and he had to choose a site that could be expanded, in order to settle the layout of the garden itself. Every spare moment from February 1932 onward was devoted to the work, and by July it was possible to open a portion of the line for traffic.



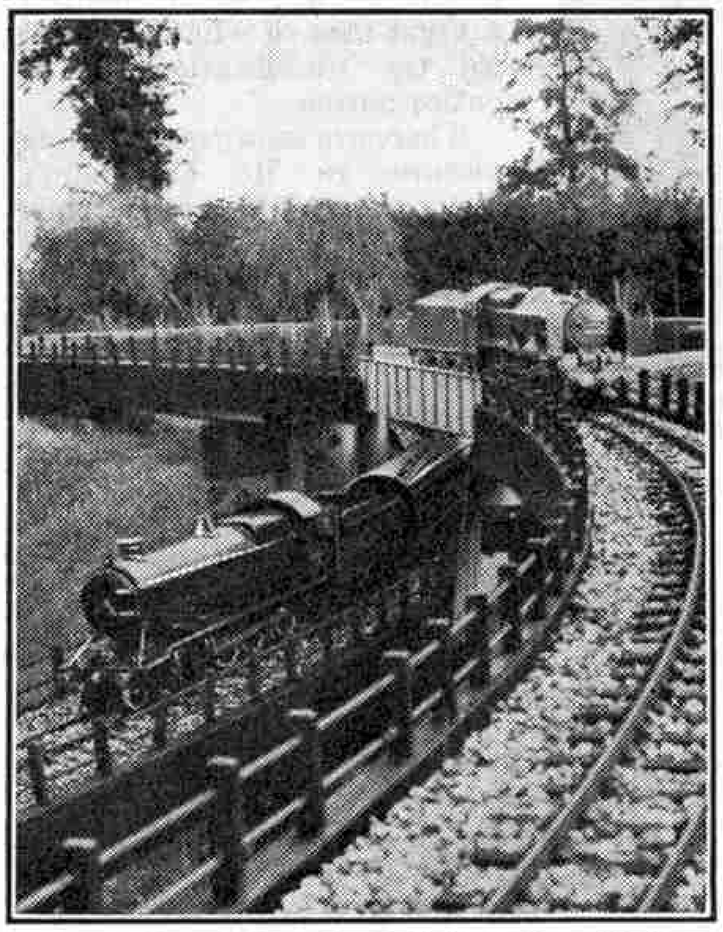
A general view of part of Mr. Victor Harrison's railway, L.M.S. "Royal Scot" in the foreground and a G.W.R. local train passing under the girder bridge.

The pictures illustrating this article are of his present railway,



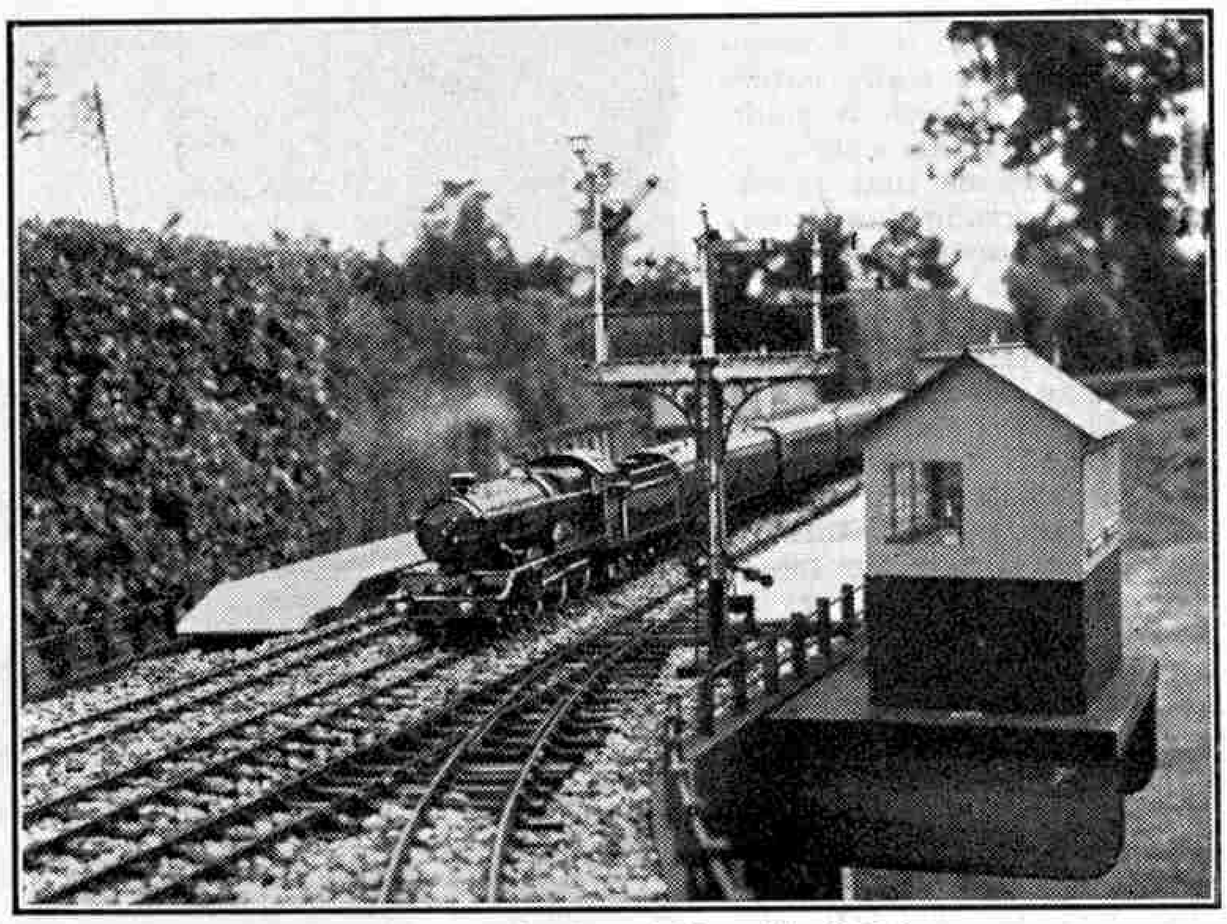
Interior view of "Hurst Central" Station, showing the engine shed.

which has progressed amazingly. Every year he has added something new, until to-day he has 37 locomotives, 41 passenger coaches, 58 goods vehicles, a third-coach S.R. battery train, a steam-rail motor coach and trailer, and a snow plough. He has the full variety of clockwork, electric and steam on his railway. He has commercially-built models, for the majority, including some very fine scale productions; but he would also remind you of his "owner built" productions, which date back to the days when, with Henry Greenly's co-operation, he built an engine with coal-fired boiler that was described in the now defunct "*Model Railways*." He says of it: "It was a success in spite of the many faults I later discovered, and even to-day gives a wonderful performance both as regards running and load pulling."



High and low levels—the G.W.R. "Consolidation" (Smithies type boiler), and the L.M.S. "Royal Scot" (by Bassett-Lowke Ltd.) running over box girder bridge.

Among his locomotives the outstanding ones are the G.W.R. "*City of Truro*," the G.W.R. "*King George V*," and a coal-fired model, a G.W.R. Consolidation. This last engine is also very powerful, and when working resembles the prototype very closely indeed. It has pulled with ease trucks loaded with coal, and gave a most realistic performance when going up the 1 in 70 rise. The "*City of Truro*" is a coal-fired model; a small one, but nevertheless she puts up a wonderful performance, doing three to four laps to one firing. He has also a German type tank engine that has done on one firing eight laps; and this will mean something to you when I tell you that the main line lap run is 430 ft., not to speak of other lines running up to 287 ft., a branch line of 228 ft., and sidings of 221 ft.

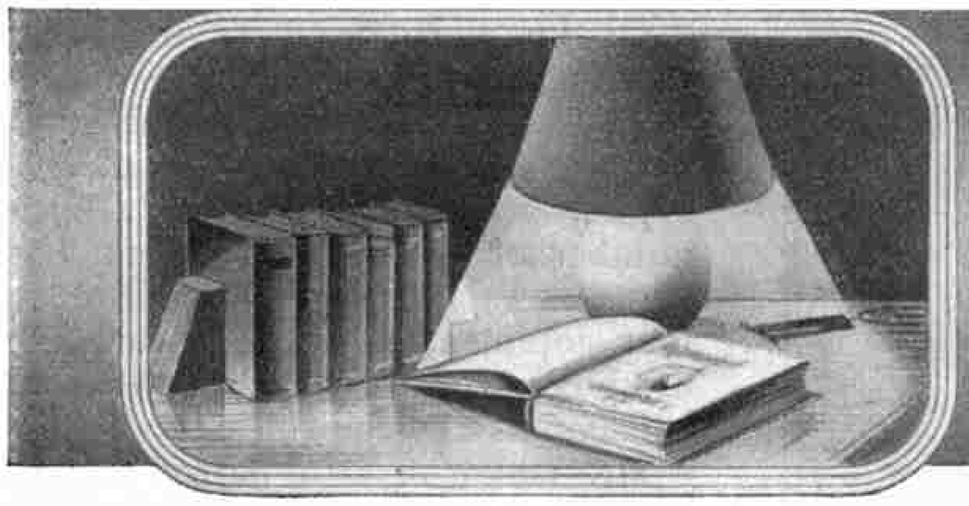


G.W.R. express passing through "Lone Pine" Station.

Of his spirit-fired engines, Mr. Harrison uses both the Smithies type boiler and one of his own design. The latter is a locomotive type boiler, but in place of a large number of small tubes he employs three large ones and has three to four sloping cross water tubes in the fire-box. This boiler has proved as efficient as the Smithies type.

Mr. Harrison is a patron of the leading commercial model-making firms, and distinguished amateurs, and last but not least is himself a practical engineer with skill as a model designer and maker. In his opinion anyone who has a preference for a model railway in the open need have no qualms as to its success in $1\frac{3}{4}$ in. gauge. He says: "My old railway gave no trouble during its 25 years. The $1\frac{3}{4}$ in. gauge commercial engines available for those who do not want to build their own can be made to operate successfully. It is not necessary to go in for $2\frac{1}{2}$ in. gauge or coal-fired engines, or even high-pressure engines with packed cylinders and valve glands, if one wishes to operate one's railway in the open. The only thing that is essential for a garden railway is that the main terminal station is under cover."

Mr. Harrison does not make his station building a workshop, and in this respect he is wise, because it always gives the railway an untidy appearance. He has a special room in his home devoted to his model making. Everything there is laid out for use at a moment's notice, and he can go in, turn the key, and with the click of the lock be in another world.



BOOKS to READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, we can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 1/– for postage to the price. Postage on different books varies, but any balance remaining will be refunded.

"The Fight to Live"

By Raymond L. Ditmars
(Scientific Book Club. 2/6 net)

There seems to be practically no limit to the many cunning schemes for attack and defence in the animal world, and the story of many of the most interesting of these, as told by Dr. Ditmars, will fascinate every reader of the Magazine, even those who do not pretend to have any special interest in animals. The author is an explorer and collector of wild creatures, and writes vividly of things that he has seen for himself. The result is a really enterprising book, which is made more interesting by a series of fine illustrations that reveal many surprising and unexpected features of the fight to live.

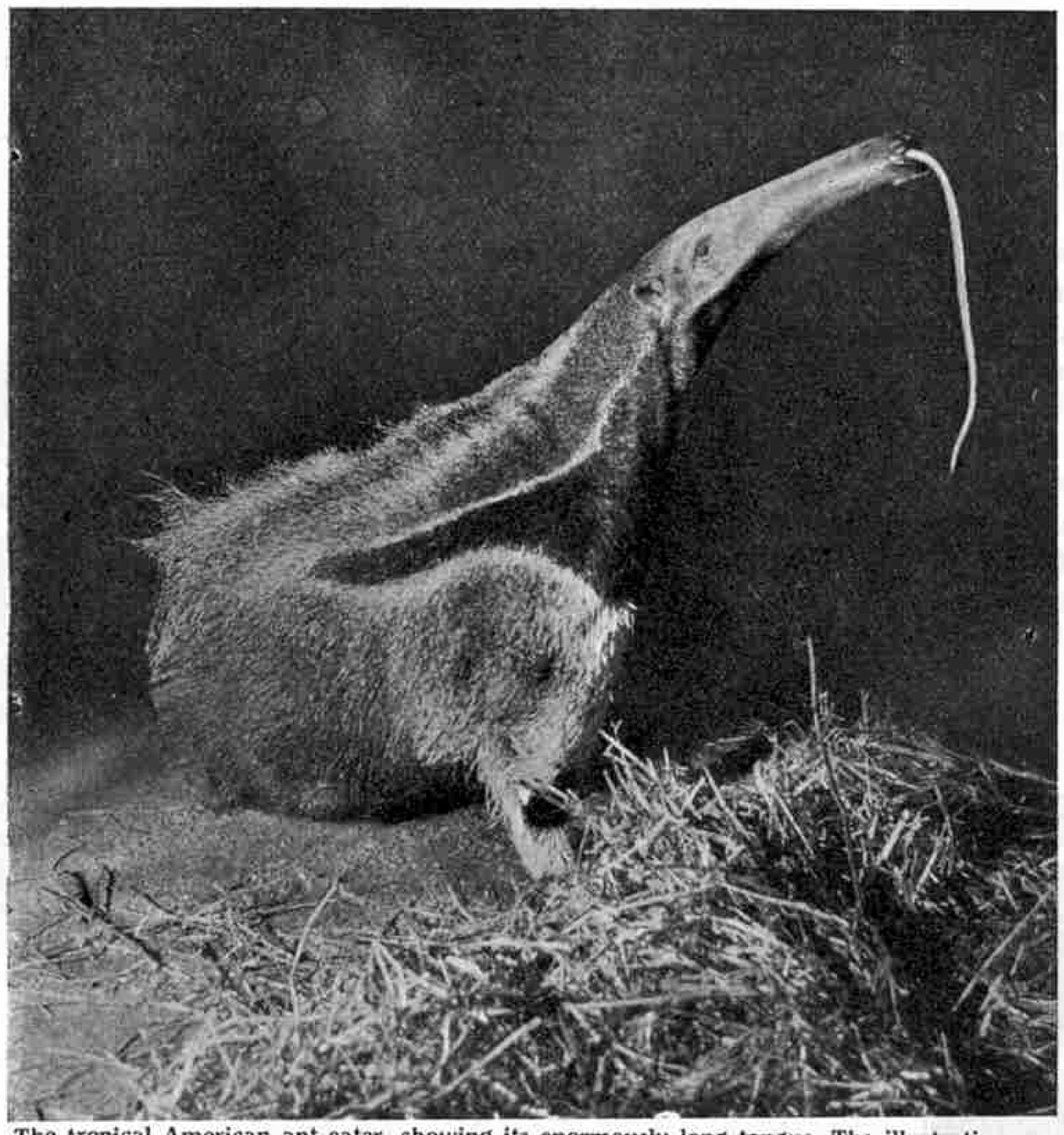
The creature that has made the most successful fight for life is Man. Although he has only inhabited the Earth for about a million years he is its unmistakable master, and has even learned how to turn to his own advantage the offensive and defensive forces of other animals. One step away from Man—but a long one!—are the apes and monkeys, which are immeasurably inferior, but still remarkable for their mental capacity. Strange to say, this is only shown in captivity, where Man can be watched and imitated.

Then we turn to creatures provided with physical weapons such as teeth, claws, horns and spikes, and even with defensive armour to aid them in their fight for life. Animals of 100 million years ago had a particularly formidable array of scythe-like teeth, head rams, spikes and tearing claws. Against these tough hides, shells or plates were almost useless, and many of the inoffensive plant-eating reptiles were compelled to grow so much armour that they were literally crushed out of existence by its weight. The fight to-day is not waged on the gigantic scale of prehistoric times, but lions, tigers, leopards and similar creatures make the Earth sufficiently dangerous for other animals to call into existence defensive weapons such as horns and antlers, and the defence that goes with speed and powers of leaping. Added to this is the protection that comes from colouring that blends with various backgrounds, and so enables timid creatures to lurk unseen by beast of prey.

After an absorbing chapter on the almost incredible industry of the beaver, the engineer of the animal world, we turn to the birds. The author approaches this subject by the story of a bird that he almost caught, and continued to pursue, only to realise in the end that he had been fooled by acting that had lured him away from the vicinity of the bird's nest. This is followed by accounts of other interesting devices, such as the concealment of nests, their construction in high trees and assembly in colonies for communal protection, and the colouring of eggs. The greatest protection is given to birds by their power of flight, and it is because of the advantage this gives them that they have such an enormous numerical superiority over other warm-blooded forms of life.

We then have amazing stories of reptiles, amphibians, and fishes. The devices the last employ are more elaborate than those of land animals. Among them we find mimicry, camouflage, changing of colour, armour plating, spines and spiked fins, some of which are poisonous, and even the power of generating terrific electric shocks.

And so we go on with story after story, of smoke screens thrown out by cuttlefish, of make-believe that leads us to believe that insects are sticks, twigs or leaves, and even of a caterpillar that deludes the larvæ that would feast upon it by pretending that its cocoon has already been invaded by other parasites. Dr. Ditmars' final chapter is probably the most remarkable of all, for in it he shows us that there was disciplined warfare by armies before man invented it. The finest example of this is supplied by the termites, which build huge communal homes and organise battalions of soldiers, some of which even wage chemical warfare by discharging burning fumes or viscid fluid upon attacking ants.



The tropical American ant-eater, showing its enormously long tongue. The illustrations on this and the opposite page are from "The Fight to Live," reviewed on this page.

"France at War"

By W. Somerset Maugham
(Heinemann. 6d.)

It is as well that we should know what France has done and is doing in wartime, particularly at the present moment when our own war effort is being intensified, and this little book tells us this. Mr. Maugham spent six weeks in making a survey of war activities in France. He visited the front line, inspected armament factories, went to sea in French warships, and followed refugees from Alsace and Lorraine to the districts in the south-west of France to which they were evacuated. Everywhere he talked to people of all ages and ranks, from generals to parish priests, and as a result he gives his readers a vivid idea of what is meant by the mobilisation of an entire nation.

There are many outstanding pictures in Mr. Maugham's story. One concerns Strasbourg, where there are now only police, customs officials and a few municipal employees to keep the empty streets clean. The Mayor described it as a dead city and spoke of the prospect of bombing, reminding the author that in 1870 the Germans ran excursion trains from towns on the other side of the Rhine so that sightseers might see Strasbourg burn. In another story we hear of a foundry, employing 2,000 men, that actually is in front of the Maginot line. There the steel manufactured during the day is shipped away every night in order to reduce the amount of booty the Germans would seize if by any chance they captured the works. There is special interest in the author's account of his trips to sea, first in a heavy cruiser and then in a torpedo boat. Altogether the booklet is a valuable record, inspiring and easy to read.

"Tight Corners"
(Allen and Unwin. 7/6 net)

This is a collection of true adventure stories, each of which is told by its hero. The story tellers did not deliberately seek the adventures that they describe. These came to them more by accident than by design, but their yarns are none the less exciting.

Adventures on land and sea and in the air are covered by this remarkable collection. We begin well with descriptions of an awkward time experienced on Mt. Everest during a fierce blizzard, and of several tight corners in which Sir Alan Cobham has found himself. Other stories are even more exciting. We have an account of the "*Titanic*" disaster by an officer who survived it; a description of the greatest volcanic eruption ever known, which blew away the Island of Krakatoa, in the East Indies; and the story of a castaway who lived for weeks on a desert island overrun by ferocious wild cats and hordes of rats.

There is remarkable variety in the book. We have, for instance, the first-hand story of a passenger in a steamship that was torpedoed in the Irish Sea during the Great War, and an account of the thrills of a hazardous voyage in an ammunition ship that took fire and ended its career in a terrific explosion. Then we read of the hair-breadth escapes of a stunt parachutist and test pilot; of the extraordinary adventures of a steeplejack demolishing old chimneys that were on the point of collapse; and of a circus hand's fight in the night with an escaped lion. Whatever the reader's tastes in thrills and excitement he is sure to find them gratified by yarns in the book.

There are seven full-page plates, with two maps illustrating special stories.

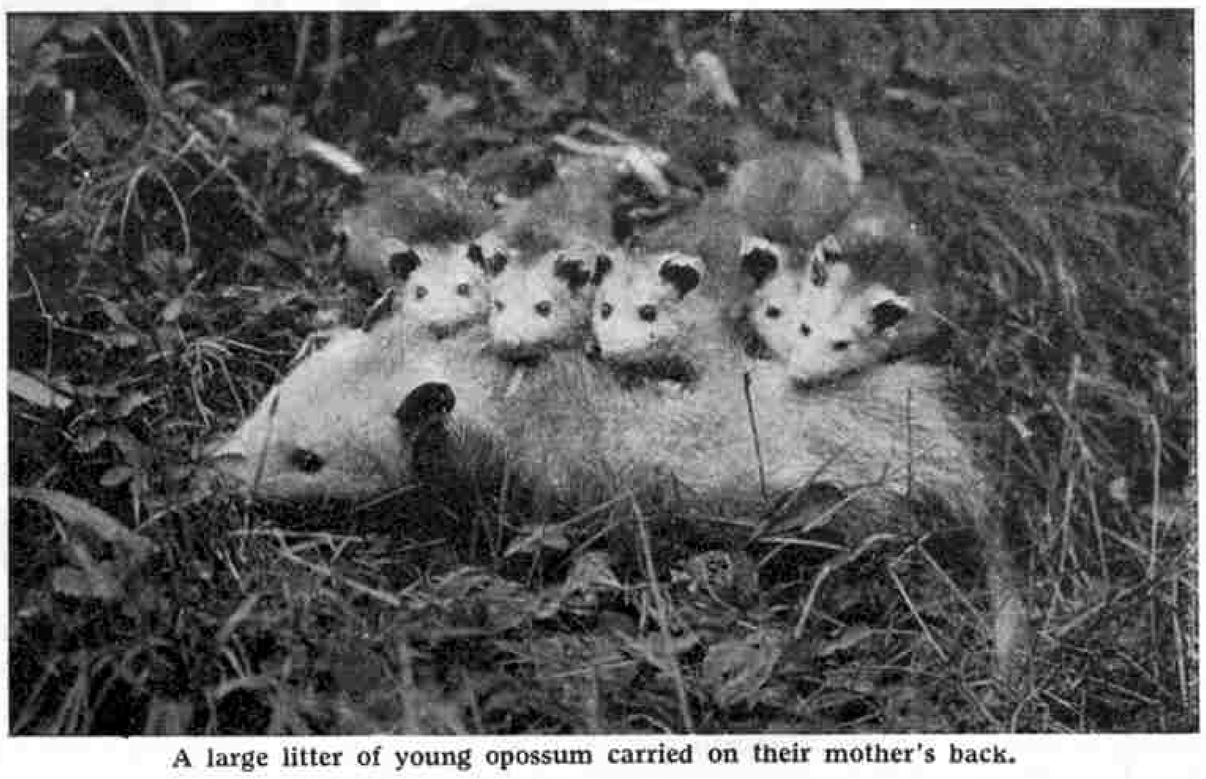
"Tommy Hawke at School"
By Michael Patrick. (Harrap. 4/– net)

We have previously met with Tommy Hawke as a detective, and in Mr. Patrick's new volume we see how he solves a school mystery. He is so young that he can pursue his investigations while posing as a special pupil in the sixth form of the school, and with him goes Jim Hart, the former C.I.D. Sergeant, who is given the less pleasant disguise of a school porter. The school cups and shields have been stolen, and it is the task of the two to find the culprit and to restore the booty. They have only five days in which to work, for at the end of that time the trophies have to be presented to the winners on Sports Day, and are soon lost in a maze of seemingly unrelated clues such as a keyhole smelling of soap, a rope ladder hidden in a hawthorn bush, and a motor cycle hired from a local garage. After many adventures and exciting experiences they capture the thief red-handed, although their plans to do this are nearly wrecked by boys who choose the very time of their midnight watch for a clandestine feast in the sports pavilion.

Mr. Patrick has written a book that is a first class mystery story with many thrills, and at the same time is a rattling good school yarn that every boy will enjoy.

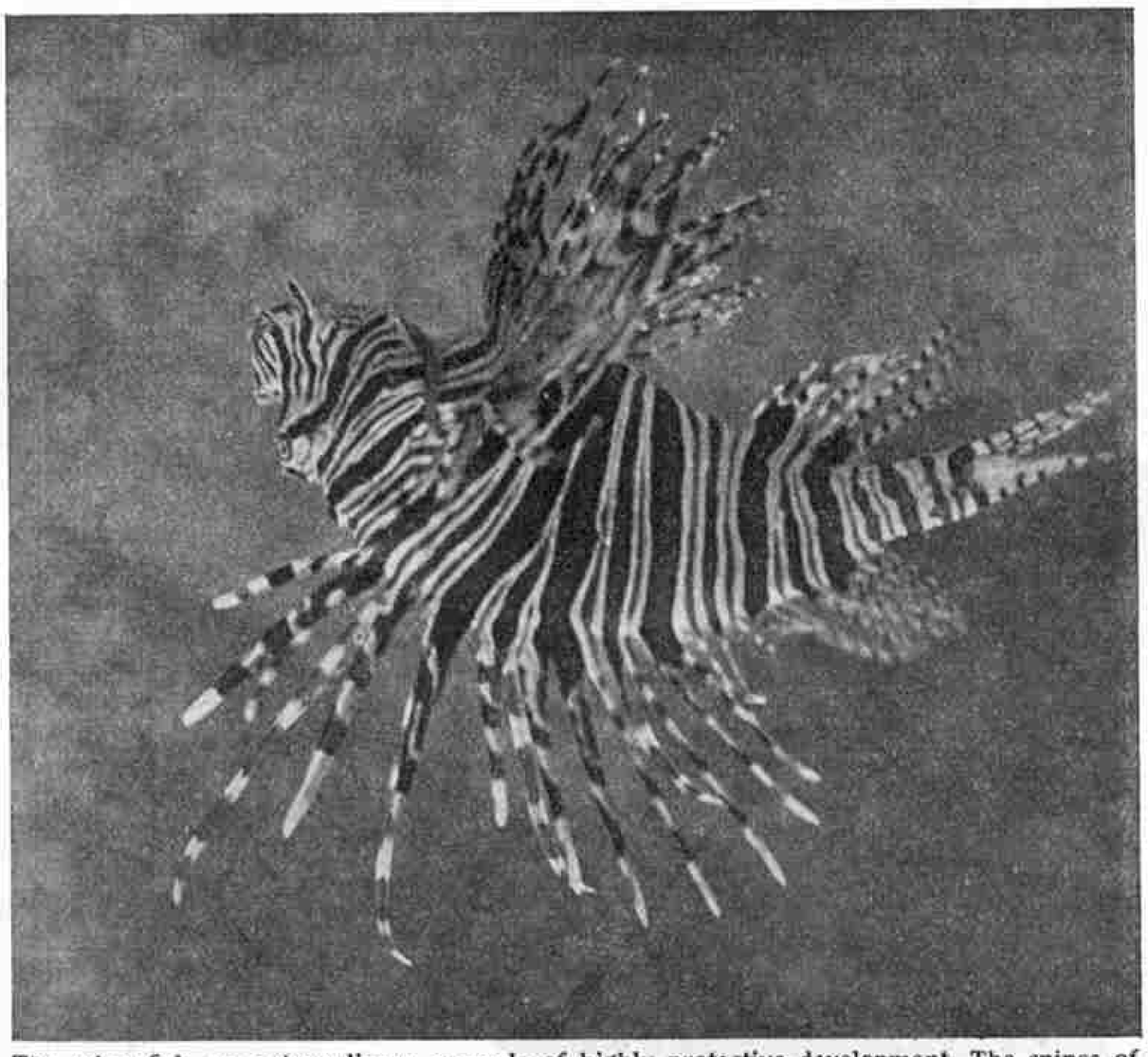
"Our Air Force"
(Ward Lock. 3/6)

The many thrilling air battles from which R.A.F. pilots have emerged victorious on the Western Front, in Norway and elsewhere, have not only won immense admiration but have created intense interest in the life and work of this vitally important Service. "*M.M.*" readers already know a good deal about current types of British military aircraft. This book presents such knowledge in handy form, and at the same time gives a splendid insight into the work of the R.A.F.



A large litter of young opossum carried on their mother's back.

The early chapters give in an interesting manner all the essential details of a career in the R.A.F., and describe the thrills of a would-be pilot's first flight. Aerobatics are an essential part of the training of an R.A.F. pilot, and the chapter dealing with this subject reviews briefly the development and importance of this aspect of flying. The work of fighter and bomber aircraft is also explained, and there is a thrilling chapter in which the reader accompanies the pilot of an R.A.F. bomber on a flight. A short survey is given of the many branches of the ground organisation that is so essential to the maintenance of efficient aircraft and the lighter side of life in the R.A.F. finds expression in an account of sports of that service. The parachute and other life-saving equipment carried by R.A.F. machines are dealt with. The book is splendidly illustrated.



The zebra fish, an extraordinary example of highly protective development. The spines of many such fish are very poisonous.

"Tom Sawyer Grows Up"
By Clement Wood. (Harrap. 5/– net)

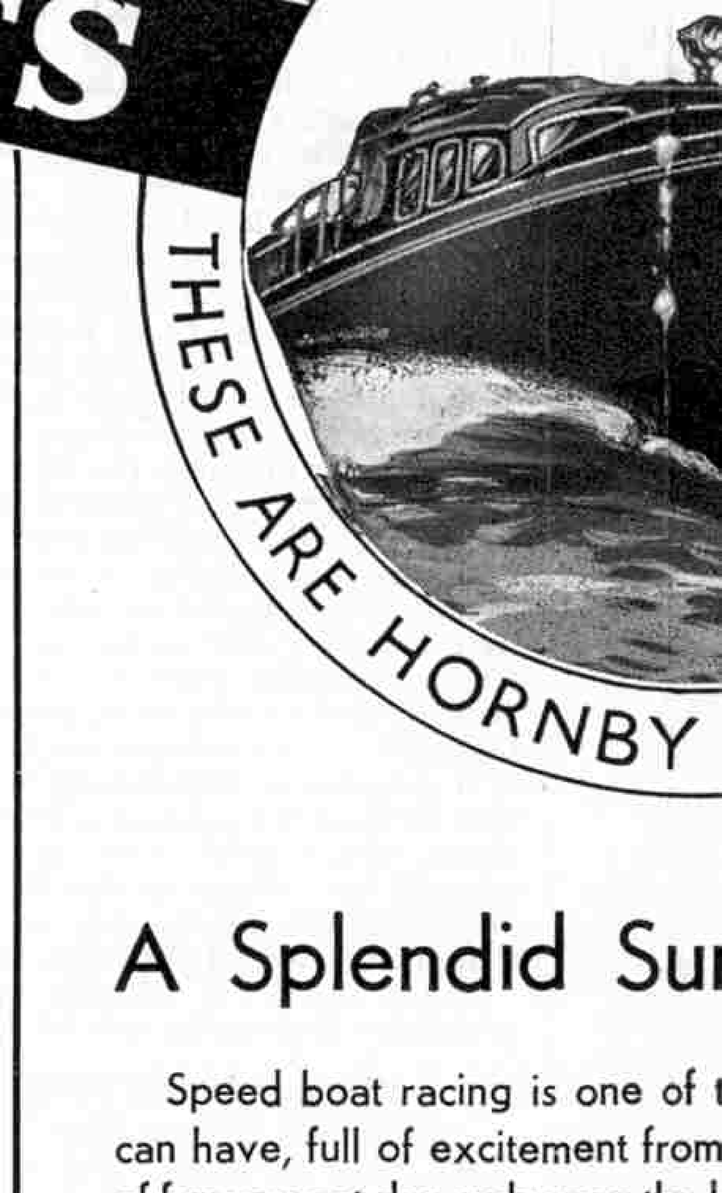
We can never read enough about Tom Sawyer, the boy hero of Mark Twain's famous book. The author himself half promised to tell us the rest of the story some day, but unfortunately he never did so. Now Mr. Wood has ventured on the difficult task, and there is no doubt of his success. Here we have the same Tom Sawyer, Huckleberry Finn, Becky Thatcher and all the other well-known boys and girls of Mark Twain's masterpiece, grown just a little older, but still spirited boys and girls full of quaint ideas and strange notions.

Tom and Huck begin very well by driving down in a goat cart to deposit in the newly-opened St. Petersburg bank the treasure they had unearthed in "*The Adventures of Tom Sawyer.*" The goat had never been in harness before, and neither Tom nor Huck had ever driven a goat. The rest can be imagined. The goat had a glorious time, charging bank Presidents and other important people, and both Tom and Huck enjoyed the fun immensely.

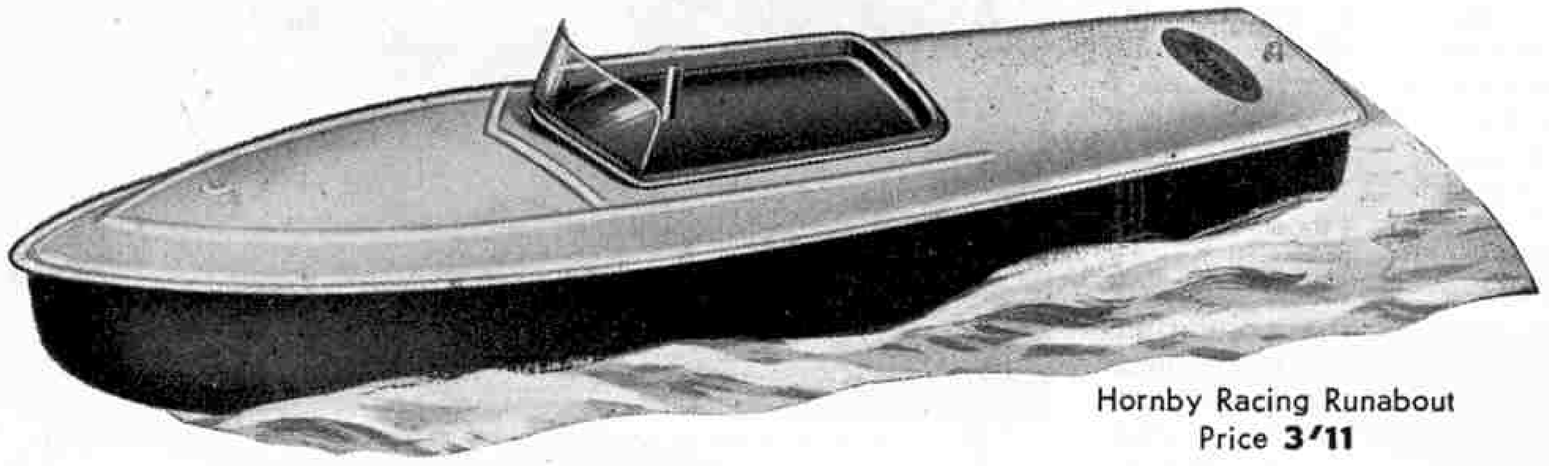
The right spirit is kept all the way through. Tom is continually in mischief and receiving correction from our old friend Aunt Polly. Sometimes he is Davy Crockett, the hero of the defence of the Alamo against Mexican hordes, and at other times he is Robin Hood, with Becky Thatcher as Maid Marian. He and Huck, with the goat, baffle robbers who have shot the President of the bank and try to run away with the gold. Two of the robbers are eventually drowned when the Mississippi overflows its banks and sweeps away most of St. Petersburg, and the last of them is captured by the two friends after the most exciting scenes.

Mr. Wood's story has the genuine Mark Twain ring and its people and their surroundings are as real as those of the first Tom Sawyer book. Every boy will enjoy the incidents and adventures described in it, and grown-ups will be delighted to have the opportunity of recalling some of the delights of Mark Twain's famous tale.

SPEED BOATS HOR



THESE ARE HORNBY



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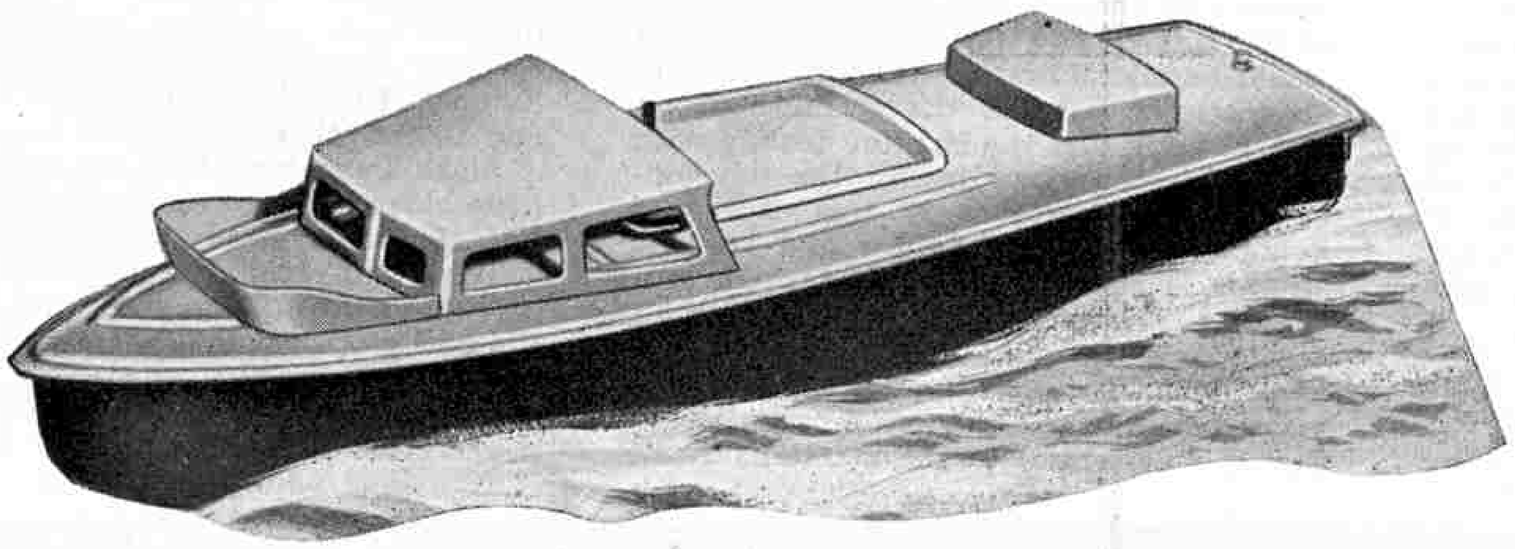

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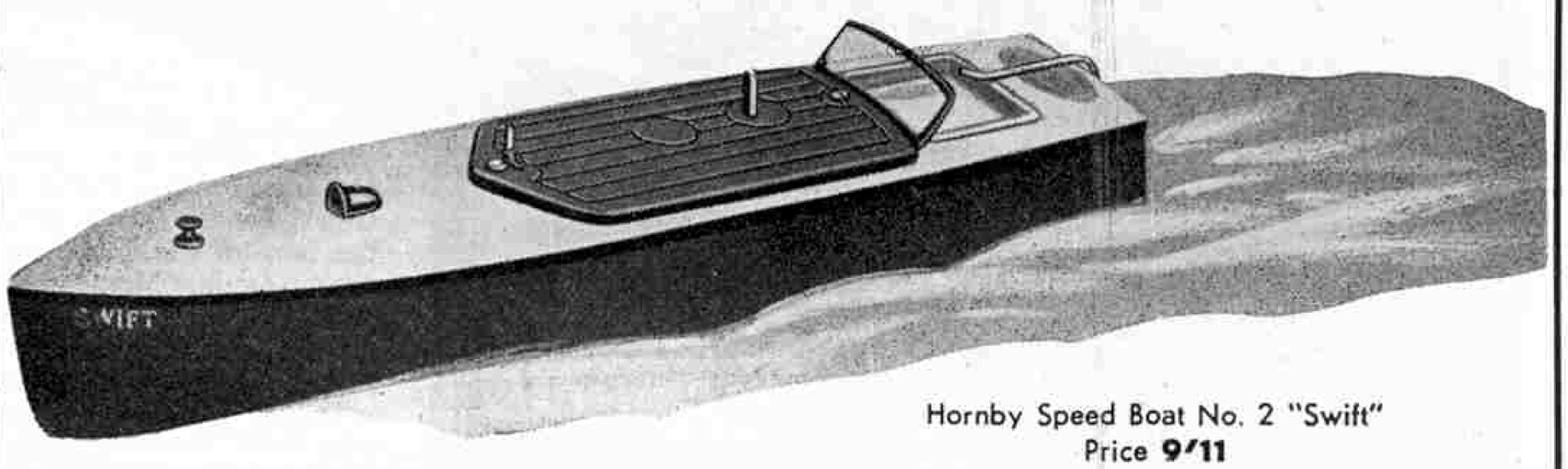

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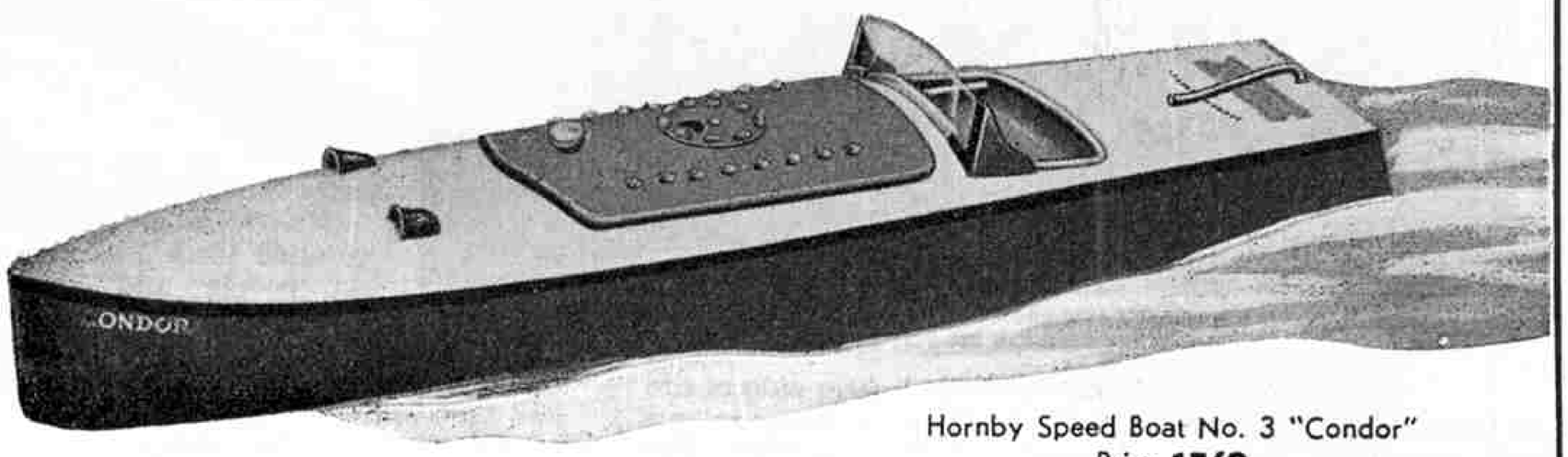

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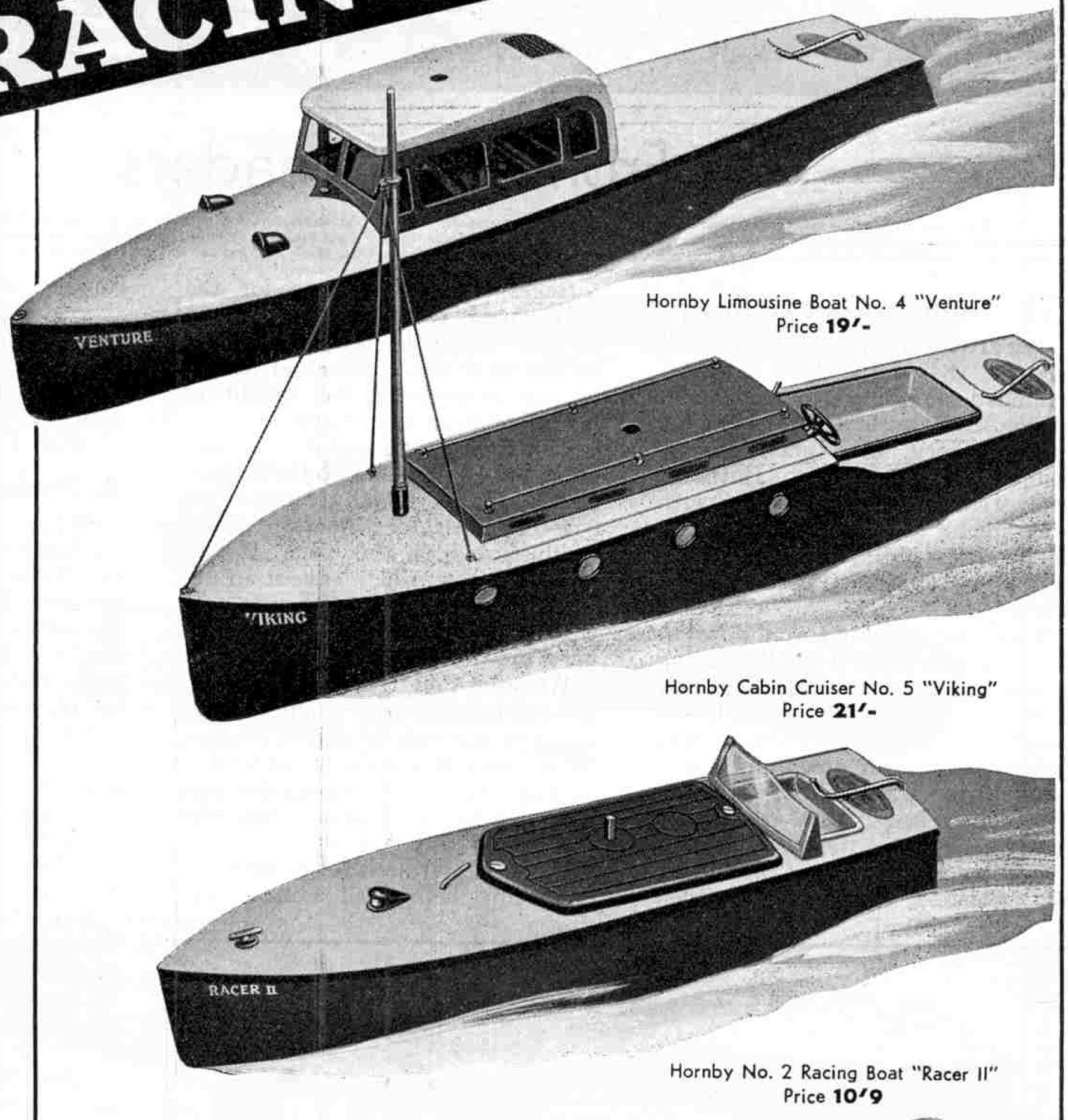

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Y RACING BOATS

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BINNS ROAD, LIVERPOOL 13

From Our Readers

These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

The Saundersfoot Railway

The article "*Forgotten Steel Trails*" on page 184 of the April "*M.M.*" reminded me of my own experience of the Saundersfoot Railway, the small colliery line that formerly connected Saundersfoot Harbour, near Tenby, Pembrokeshire, with some inland collieries. This was not finally closed until April of last year, and I was able to travel over the line in 1938.

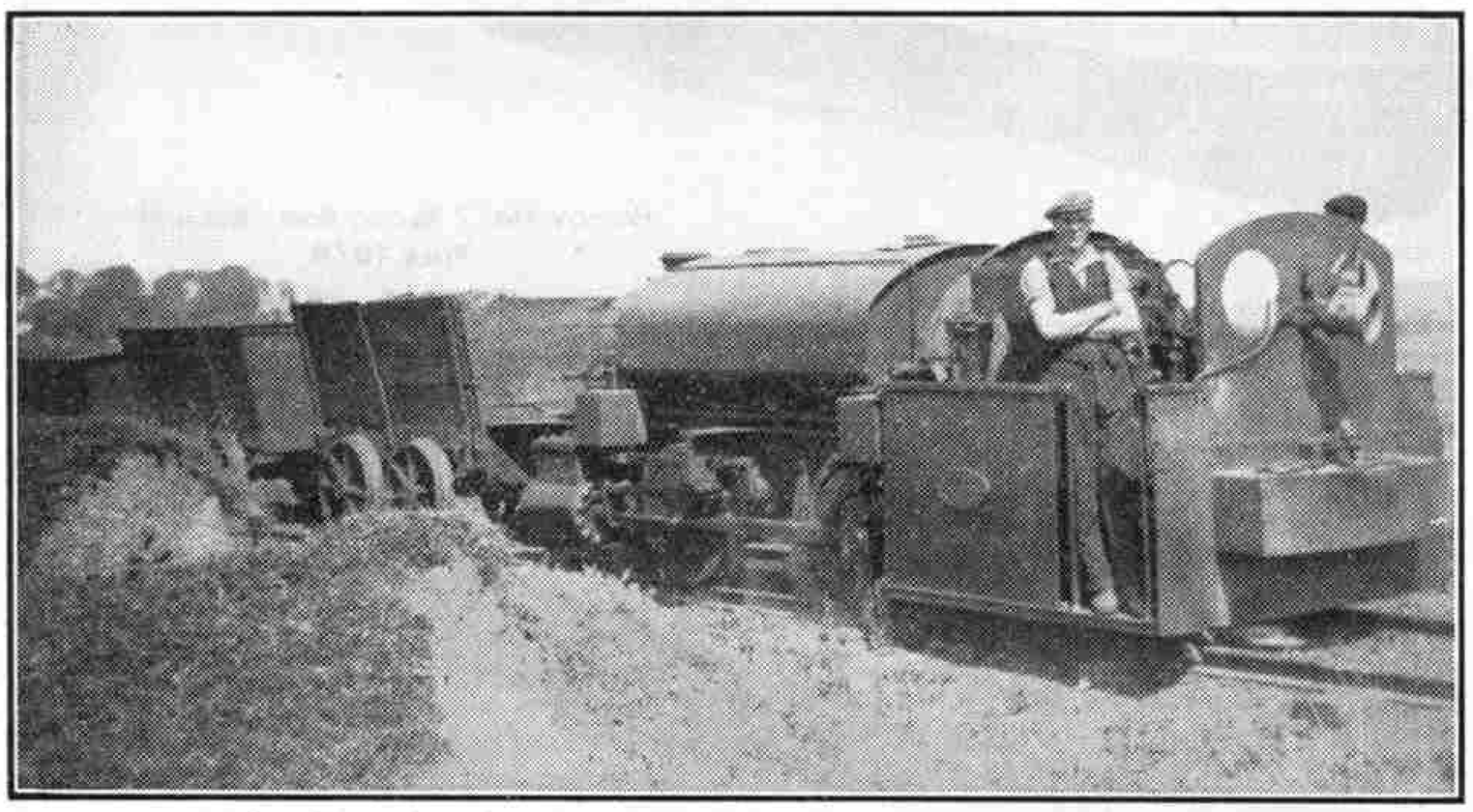
Early one morning I went down to the harbour, where a small coasting steamer was being loaded, and found there a quaint little 0–4–0 saddle tank, built in 1874. It was painted a pleasant green and had a brass dome, and was busy shunting. The driver invited me on to the footplate, and we moved off, pushing the wagons in front of the engine. We whistled sharply, and then crossed the village street while a man with a red flag held up the traffic. We travelled up a little valley and past some quaint white cottages, built years ago for the railwaymen, to the foot of a steep incline. There the trucks were detached from the engine and hauled up the incline by the weight of loaded ones coming down.

The engine returned to the harbour, but I walked on up the incline, at the top of which I found the 0–4–0 saddle tank "*Bulldog*," which is illustrated on this page. It was built very low, which gave it an unusual appearance, and I was told that this was because there was a very low tunnel on the route.

We moved off, the trucks rattling, and proceeded past some sidings into a picturesque tree-lined avenue. After crossing a road we entered a cutting that ended in a tunnel, and there we had to "duck down," for the engine only just fitted into it. We were in darkness for a fair time, the tunnel being half a mile long, and were glad to come out on to a wide common. There was no fencing here, and cows were grazing close to the track, but soon we were running between hedges again, and shortly afterwards we descended a steep grade that ended in a colliery yard.

The whole journey from the harbour had taken about 20 minutes.

G. G. CADDY (South Croydon).



"Bulldog," an 0-4-0 saddle tank engine of the Saundersfoot Railway, a Pembrokeshire line now taken up. The engine was built low to allow it to pass through a low tunnel. Photograph by G. G. Caddy, Croydon.

A Drake Relic in California

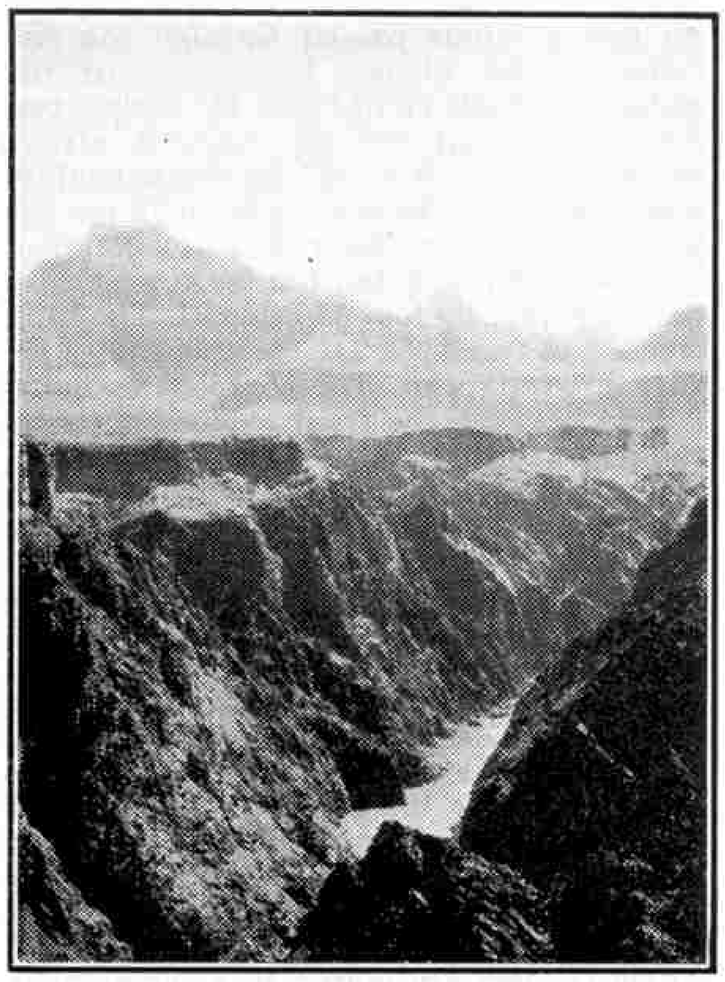
When Drake sailed up the Californian coast in 1579 he failed to discover San Francisco Bay, possibly because its entrance was hidden by fog. He gave his name to Drake's Bay, however, some 20 miles farther up the coast. There he planted a "firme post" in the beach and nailed to it a "Plate of Brasse" on which he had had engraved "*By the Grace of God and in the Name of Herr Majesty Queen Elizabeth of England and her Successors forever I take possession of this Kingdome.*"

One day in 1932 a chauffeur waiting for his employer idled along the shore of Drake's Bay. He kicked up a heavy sheet of metal and, thinking it might prove useful, put it into the car. Some days later he decided that the metal was useless and threw it away on to a beach in San Francisco Bay. There it lay for several more years and was then found by a young man who was amusing himself by throwing stones into the water. This young man took the plate home and cleaned it, whereupon the inscription became visible. It was Drake's "Plate of Brasse." The experts were greatly excited by the find, but could not understand how it came to be found in San Francisco Bay, since it was well known that Drake had not been there. Eventually the matter got so much publicity that the chauffeur read about it, and came forward and told his share in the business.

A. HARVEY (Appley Bridge).

Colossus of Canyons

The picture I retain in my mind of the Grand Canyon is one of an enormous gash 10 or 11 miles wide and a mile deep, with the Lower Gorge, another "channel" 1,100 ft. deep and 300 ft. wide, at the bottom of it. The Lower Gorge is a canyon



Looking down from the Tonto plateau into the Lower Gorge of the Grand Canyon of the Colorado. Photograph by M. Anderson, Newcastle-on-Tyne.

inside a canyon, and would be famous apart from its association with the Grand Canyon. Through it runs the Colorado River, which at this point is 100 yds. wide.

My trip down the canyon was an inspiring experience. It was made on a mule, a sure-footed creature that picked its way carefully along the trails that zig-zagged down the canyon walls. The mules employed for this purpose have one disconcerting habit. At the end of each stretch of the zig-zag they hang their heads out over the sheer drop before turning to tackle the next stretch!

The level portion at the top of the Lower Gorge is called the Tonto Plateau. As I rode along this I found it difficult to realise that I was in a gash 5,000 ft. below the level of the surrounding country. Instead, the feeling experienced is that the ride is among mountains, and that these are towering above one on all sides.

It is possible to walk down into the canyon and to walk back again, but the walker has to be in really good condition to do it. It is advisable for those who wish to do this to make use of the cool hours of the night and early morning, for in the middle of the day the Sun's rays reflected from the walls make it extremely hot down in the canyon. I emptied two canteens of water on one afternoon. A further snag is that in climbing out of the canyon the climb becomes more and more severe as the rim is approached, that is at the stage of the journey at which one hopes the toil will ease off. Every year some foolhardy persons go on foot down the canyon during the day, and guides with mules have to be sent down to bring them back after they have collapsed on the return journey.

M. ANDERSON (Newcastle-on-Tyne).

Ringing Birds on Skomer Island

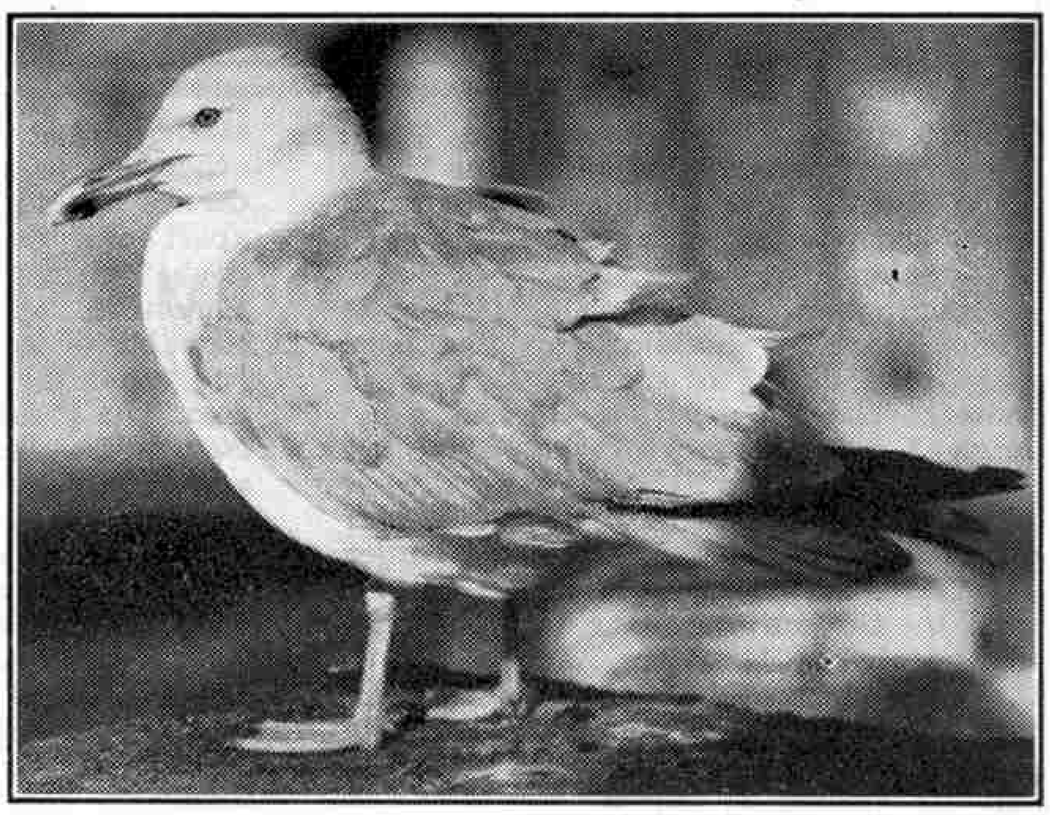
Recently I was one of a party that visited Skomer Island, the bird sanctuary off the coast of Pembrokeshire, in order to ring the Manx shearwaters that nest there. We left Marloes, a little village at the south west corner of the county, at seven o'clock in the evening, and as we rounded the corner of the headland we received the full force of the long Atlantic rollers and felt them hitting the bottom of the boat. The grey seals we saw were as much at home in this as the herring gulls hovering above us were in the air.

We were landed on the Island about a quarter past seven, and until it was dark spent the time in looking round and finding the places where the Manx shearwaters were most abundant. In some places the nests were so crowded that the burrows in which the shearwaters had laid their eggs, one to each nest, were only an inch or two below the surface. It was while walking through one of these colonies that I went through the roof of a nest, and was able to ring the unfortunate shearwater underneath.

Though it became dark round about nine o'clock, it was not until midnight that the shearwaters began to come out of their burrows. It was as though the first call was the sign for the others to join in the chorus. The noise gradually increased as one after the other joined in the weird concert, and then the birds started coming in from the sea, swooping, diving and wheeling like huge bats. As we walked along the path we would see a patch of white ahead. Slowly creeping to within one or two yards of it, we would make a dive to capture it, and when the bird had been caught we would look at its markings and at its bill, long and slightly hooked at the end, to make sure it was a shearwater. Then a small aluminium ring bearing the address of the British Museum and a code number was slipped on its leg, and it was released. We had to adopt this procedure because it was late in the season, and some of the birds had departed. When they are more numerous three or four can be picked up at a time. In any case they prefer dark nights, and there are never many out on a fine starlit night.

Next morning we noticed that all the guillemots, called "elegugs" by the local Welsh fishermen, and the razorbills had evidently migrated a few days before, though there were signs of where they had nested. There were very few puffins left, and we were not able to approach them, though we watched them scudding across the surface of the water and plunging after fish. Herring gulls and black-backed gulls chased them, but they had not the speed of the puffins.

The cormorants had finished nesting, and we noticed them flying across the water two or three together in line ahead. We noticed also parent wheatears leading their young ones among the heather and bracken in search of food.



A herring gull. Photograph by G. H. Coates, New Earswick, York.

GEOFFREY H. COATES
(New Earswick, York).

A Special New Model for Large Outfits

Diesel-Engined Motor Tractor

MANY model-builders are eager to build models that are larger and of a more ambitious type than those described each month in the "*New Meccano Models*" pages of the "*M.M.*" For these Meccano enthusiasts we are describing this month a splendid creeper tractor that is attractive in construction and realistic in action.

The model is shown in the upper illustration on this page. It is based on a type of Diesel-engined tractor used in agriculture, and can be steered by varying the relative speeds of its creeper tracks. These are driven through differential gear by an E120 Electric Motor, each creeper being controlled by a separate contracting band type brake.

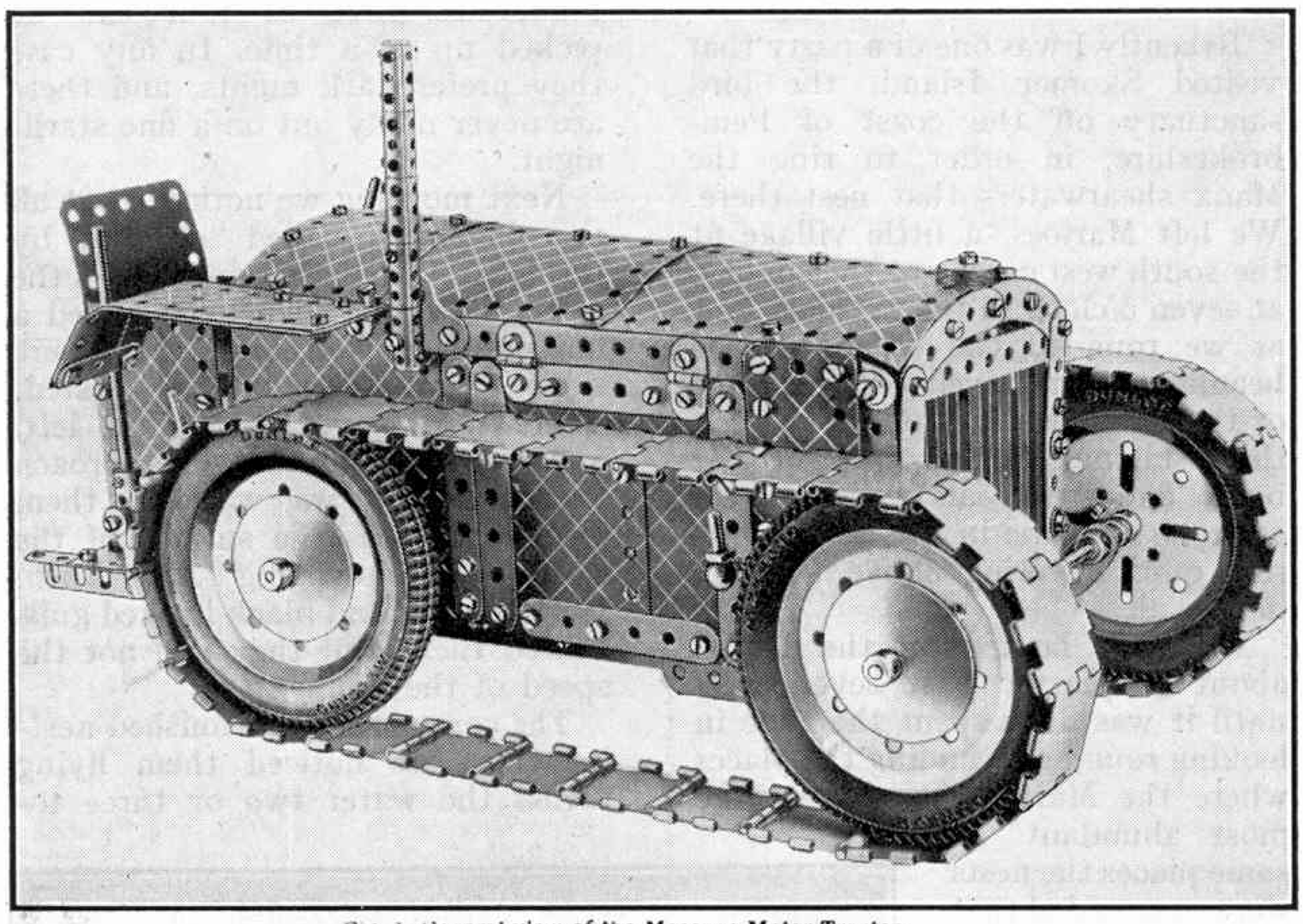


Fig. 1. General view of the Meccano Motor Tractor.

Construction of the model tractor is commenced by building up the side members 1, Fig. 3, of the chassis. Each of these consists of a $9\frac{1}{2}$", a $4\frac{1}{2}$" and a $2\frac{1}{2}$" Angle Girder bolted together. The $2\frac{1}{2}$" Girder overlaps the $9\frac{1}{2}$" Girder by 2", and its flange is placed outward. The $4\frac{1}{2}$" Girder is bolted to the other end of the $9\frac{1}{2}$" Girder and overlaps it two holes. The slotted holes of all the Girders except the $4\frac{1}{2}$" Girder are horizontal. Two $1\frac{1}{2}$" Strips 12 are bolted to the flanges of an E120 Motor, so that the Strips project half an inch outward. The girders are now bolted to the Motor 3, and are spaced $2\frac{1}{2}$" apart.

Two $2\frac{1}{2}$" $\times 2\frac{1}{2}$" Flat Plates 4, Fig. 4, are spaced 2" apart by two Angle Girders 5. The Angle Girders are held to the Plates by Angle Brackets. Two of the Bolts holding the Angle Brackets are seen at 6. At one side the Plates are held to the chassis by two Reversed Angle Brackets 7, and at the other by a $1\frac{1}{2}$" Flat Girder 8, Fig. 3. The bearings for the back axle are two Trunnions, held by the Bolts 9.

Two 1" Triangular Plates 10 are attached to the Motor. One of them is bolted to the flange and the other is held to the Motor side plate by an Angle Bracket. The various gears of the transmission can then be placed in position.

A Worm is secured to the armature shaft of the Motor. This meshes with a $\frac{3}{4}$" Pinion on the Rod 11, Fig. 4. A 2" Axle Rod 12 is journalled in the 2" Angle Girders. One end of this carries a $1\frac{1}{2}$" Contrate Wheel 13 that meshes with the $\frac{3}{4}$" Pinion, and on the other end is a $\frac{1}{2}$" Pinion. A $3\frac{1}{2}$" Rod 14 carries two $1\frac{1}{2}$" Contrate Wheels about $\frac{3}{4}$" apart and on the Rod between them is a $\frac{1}{2}$" diameter $\frac{1}{2}$" face Pinion 15. This Rod is slideable in its bearings and forms the reversing gear. The $\frac{1}{2}$" diameter $\frac{1}{2}$" face Pinion meshes with a 57-teeth Gear on the 3" Rod 16, Fig. 3. One end of this Rod carries a Collar and the other end a $\frac{3}{4}$" Sprocket Wheel 17.

Four $2\frac{1}{2}$" Curved Strips are overlapped one hole to form a compound 3" curved strip of double thickness. This is bolted to the $2\frac{1}{2}$" Angle Girders of the chassis by $\frac{1}{2}$" Bolts, but is spaced from the Girders by three Washers. The same operation is repeated on the other side of the chassis.

The radiator fins are 13 $4\frac{1}{2}$" Strips, which are spaced from each other by Spring Clips 20 on two 4" Rods passed through the end holes of the Strips. The frame of the radiator is built up of three $4\frac{1}{2}$" Strips, two $2\frac{1}{2}$" Strips, and two $2\frac{1}{2}$" Curved Strips, bolted together. Two $4\frac{1}{2}$" Strips are held by Angle Brackets to the frame to form the sides, and the radiator fins are clamped between the frame and the back, which are held together by four $\frac{3}{4}$" Bolts 21. The back consists of two $4\frac{1}{2}$" $\times 2\frac{1}{2}$" Flexible Plates 19, Fig. 3, overlapped. The complete radiator is held between the front axle supports by the Rod 22 fitted with a Collar on each end.

The plates forming the bonnet top are supported by two $9\frac{1}{2}$" Angle Girders attached at one end to the sides of the radiator by means of Flat Brackets, one of which is shown at 23, Fig. 3. Centrally between the Girders is a compound 10" angle girder consisting of a $9\frac{1}{2}$" and a $1\frac{1}{2}$" Angle Girder overlapped two holes. The front end of this built-up girder is attached to the top of the radiator by an Angle Bracket held by the Bolt 24. Through the other hole in this Angle Bracket passes a $\frac{3}{4}$" Bolt fitted with six $\frac{3}{4}$" Discs that form the radiator cap. The rear ends of the $9\frac{1}{2}$" Angle Girders are bolted to a rectangular frame made up from two $3\frac{1}{2}$" Angle Girders, a 4" Angle Girder and two $2\frac{1}{2}$" Curved Strips. The lower ends of the $3\frac{1}{2}$" Girders are attached to the chassis by Angle Brackets.

The platform for the control levers consists of two $4\frac{1}{2}$" $\times 2\frac{1}{2}$" Flexible Plates 25 overlapped two holes and strengthened by a 3" Angle Girder at the rear. The back of the bonnet is filled in with a $4\frac{1}{2}$" $\times 2\frac{1}{2}$" Flexible Plate and a $4\frac{1}{2}$" Strip. On this is mounted a switch 26 consisting of a Threaded Pin held by a Nut in the slotted hole of an Angle Bracket. The Angle Bracket pivots on the shank of a $\frac{3}{4}$" Bolt lock-nutted to the $4\frac{1}{2}$" $\times 2\frac{1}{2}$" Flexible Plate. The Nut on the Threaded Pin makes contact with the head of a 6BA Bolt insulated from the Flexible Plate by Insulating Bushes. Firm contact between the Nut and Bolt head is ensured by a Compression Spring on the $\frac{3}{4}$" Bolt.

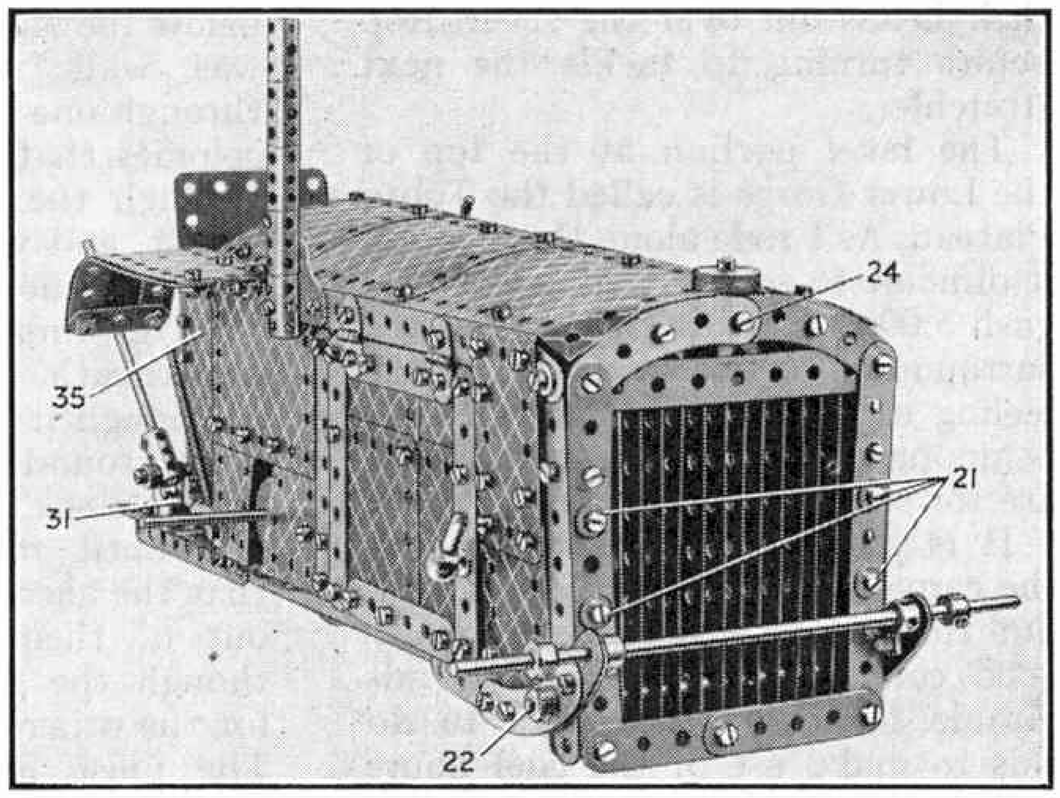


Fig. 2. The Tractor with creepers removed to show details of the bonnet.

Before the bonnet casing is completed the differential gear and reversing gear must be added. The differential gear is shown in Fig. 4. The frame is composed of two $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips 27 bolted between a 3″ Sprocket Wheel and a Bush Wheel, the Double Angle Strips being spaced from the Sprocket Wheel by three Washers on each Bolt, and from the Bush Wheel by one Washer on each Bolt. A 2″ Rod is journalled in opposite holes in the Double Angle Strips and is gripped by a Grub Screw in a Coupling 28. On each side of the Coupling is a $\frac{7}{8}''$ Bevel Gear spaced from it by a Collar. Two more $\frac{7}{8}''$ Bevel Gears are carried on two $3\frac{1}{2}''$ Rods journalled in the longitudinal bore of the Coupling. These Bevels are spaced from the Coupling by Washers. The Rods are passed through the Trunnions held by Bolts 9, and a 1″ Pulley is put on each Rod outside the Trunnions. Both the Bush Wheel and the Sprocket Wheel are free on their respective Rods, but the Bevels are fixed to their Rods by Grub Screws. The 3″ Sprocket Wheel is connected to the $\frac{3}{4}''$ Sprocket Wheel 17 by a length of Sprocket Chain. The drive is transmitted to the creeper tracks by the rear wheels. These consist of 3″ Pulleys fitted with Tyres and Wheel Discs, and they are mounted securely on the differential shafts.

Construction of the gear changing mechanism is commenced by fixing two Collars on the right-hand end of Rod 14, spacing them about $\frac{3}{8}''$ apart. A 2″ Screwed Rod 29 is inserted in the threaded hole in a Collar on the $6\frac{1}{2}''$ Rod 30, which is journalled in Angle Brackets bolted to the sides of the chassis. A Coupling fitted with a $2\frac{1}{2}''$ Screwed Rod is fixed on the other end of the $6\frac{1}{2}''$ Rod to form the reversing lever.

The model is steered by altering the speeds of the creeper tracks relative to each other. This is effected by means of two

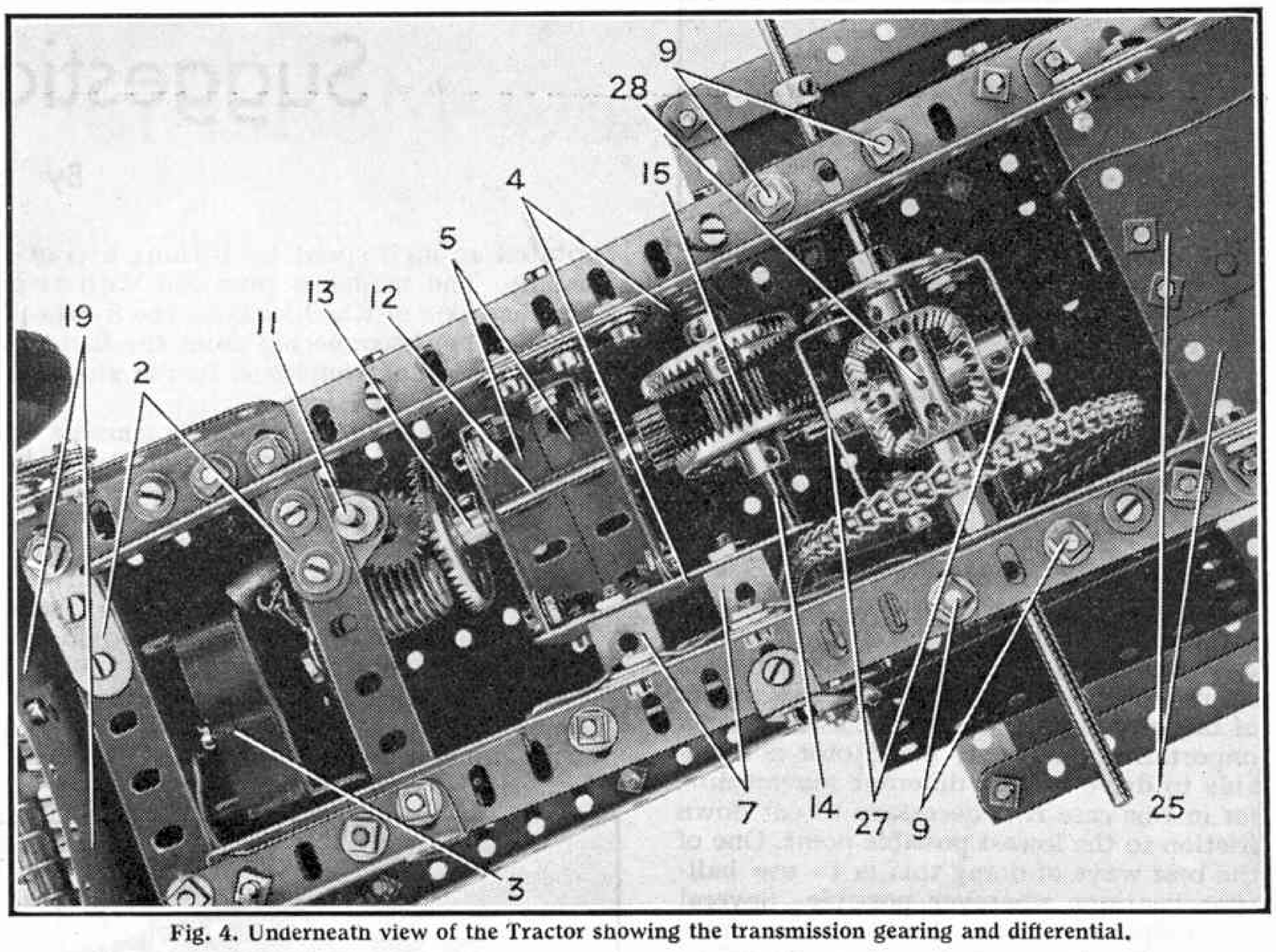


Fig. 4. Underneatn view of the Tractor showing the transmission gearing and differential.

contracting band brakes, fitted one to each half of the rear axle. Each brake, with its control gear, is constructed as follows. A 4″ Axle Rod is held in the bore of a Coupling and forms the control lever. The Coupling is held by two $\frac{3}{8}''$ Bolts between the arms of a small Fork Piece 31, which is fixed to the chassis by a $\frac{1}{2}''$ Bolt. A piece of Cord is tied to the Bolt 32, as shown in Fig. 3, and is then passed over the 1″ Pulley on the differential shaft and tied to the Rod of the control lever.

One side of the bonnet casing is provided with a hinged inspection door. Two $3\frac{1}{2}''$ Strips, one of which is shown at 33 in Fig. 3, are fixed between the $9\frac{1}{2}''$ Angle Girders of the bonnet frame and the chassis. They are held in position by Angle Brackets and Flat Brackets, and one of them is bolted 1″ and the other 5″ from the front end of the chassis. The forepart of the front side is filled in with two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates overlapped as shown. The inspection door consists of two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates and two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates, bolted together to form a rectangular frame measuring $4'' \times 3\frac{1}{2}''$. This is strengthened by two $3\frac{1}{2}''$ Strips and two 3″ Strips bolted around its edges as shown in Fig. 2, and is fitted with two Hinges. The handle is a Handrail Support fitted with a Threaded Pin in its threaded hole. A Pawl without boss is lock-nutted on the shank of the Handrail Support to form the latch.

The driver's seat is a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate fixed between sides consisting of $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates, one of which is shown at 35 in Fig. 2.

The front wheel axle can now be placed in its bearings. It is an 8″ Rod and is held in position in the Curved Strips of the chassis by means of Collars, as shown in Fig. 2. Two 3″ Pulleys, complete with Tyres and Wheel Discs, are placed on the ends of the Rod and are kept in place by further Collars. The Pulleys must revolve freely on the Rods.

Each of the creeper tracks consists of 25 Dinky Builder Small Squares, linked together to form an endless belt by means of Dinky Builder $1\frac{1}{16}''$ Rods.

The electrical connections to the Motor and its control switch are made as follows. Two Terminals are fixed to a 3″ Angle Girder bolted to the side girders of the chassis at the rear end. The Terminals are insulated from the Girder by means of Insulating Bushes and Washers. A wire is taken direct from one of the Terminals to one of the terminals of the Motor. A second wire is then led from the second Terminal to the Bolt of the Switch 26. The Bolt holding the switch arm is then connected to the other terminal of the Motor. All the gears and bearings of the model should be oiled before it is set in motion.

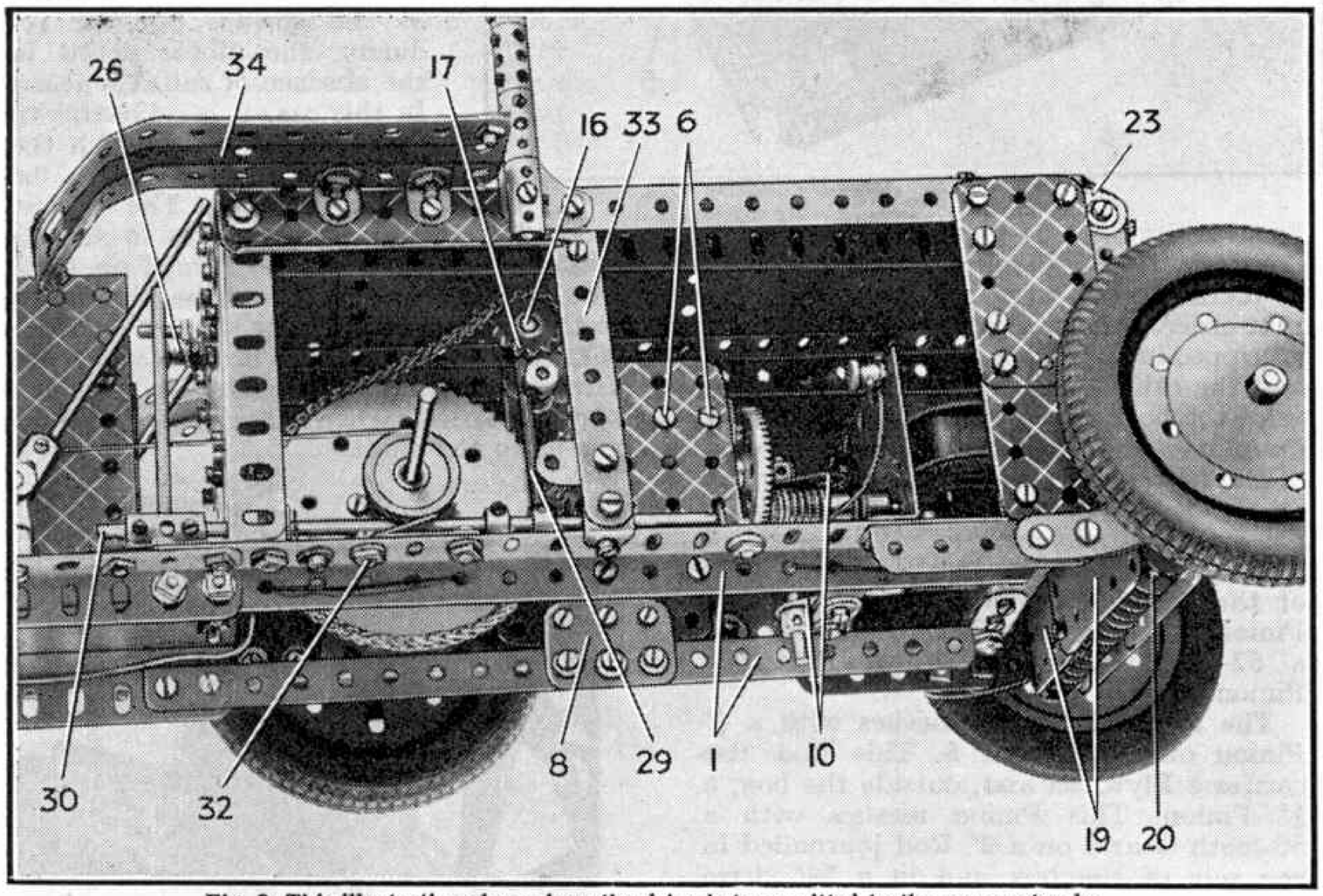


Fig. 3. This illustration shows how the drive is transmitted to the creeper tracks.

Parts required to build model Creeper Tractor: 4 of No. 2; 17 of No. 2a; 6 of No. 3; 2 of No. 4; 2 of No. 5; 8 of No. 6a; 5 of No. 8a; 2 of No. 9a; 2 of No. 9b; 2 of No. 9c; 4 of No. 9d; 3 of No. 9f; 8 of No. 10; 32 of No. 12; 2 of No. 12b; 1 of No. 13a; 1 of No. 14; 1 of No. 15; 1 of No. 15a; 4 of No. 16; 1 of No. 16a; 1 of No. 16b; 2 of No. 17; 4 of No. 19b; 2 of No. 22; 1 of No. 24; 1 of No. 25; 1 of No. 26; 1 of No. 26a; 1 of No. 27a; 3 of No. 28; 4 of No. 30; 1 of No. 32; 28 of No. 35; 224 of No. 37a; 208 of No. 37b; 85 of No. 38; 1 of No. 40; 2 of No. 48; 2 of No. 48a; 21 of No. 59; 9 of No. 63; 2 of No. 72; 2 of No. 77; 1 of No. 80c; 1 of No. 81; 12 of No. 90; 1 of No. 94; 1 of No. 95b; 1 of No. 96a; 1 of No. 103h; 6 of No. 111; 2 of No. 111a; 10 of No. 111c; 2 of No. 114; 2 of No. 115; 2 of No. 116a; 1 of No. 120b; 2 of No. 125; 2 of No. 126; 1 of No. 136; 4 of No. 142b; 1 of No. 147c; 6 of No. 182; 7 of No. 188; 2 of No. 189; 7 of No. 190; 6 of No. 190a; 7 of No. 191; 2 of No. 192; 5 of No. 217b; 4 of No. 219; 3 of No. 1575; 3 of No. 1583; 3 of No. 1563; E120 Electric Motor; 50 Dinky Builder Small Squares; 50 Rods from Dinky Builder $1\frac{1}{16}''$ Rods.

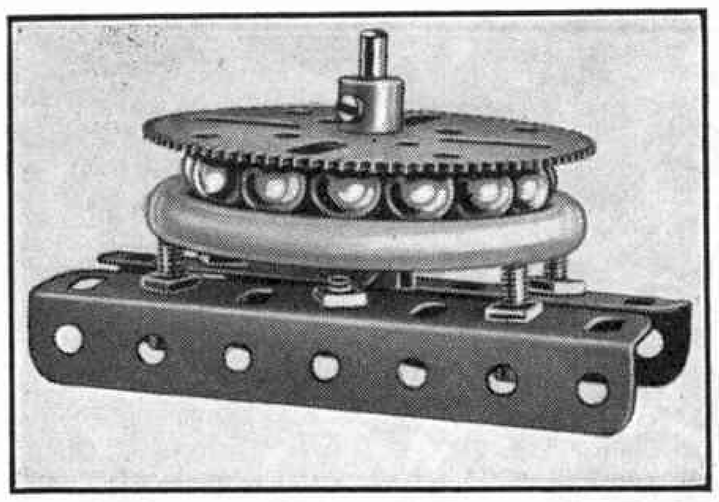


Fig. 475

(475) A Built-up Ball Race for Heavy Models

(J. A. Blacklin, Liverpool)

In building large working models that carry heavy revolving superstructures it is essential to mount the moving parts in stout bearings that run freely. This aspect of model-building becomes of even greater importance when only one Motor is available to drive several different movements, for in this case it is necessary to cut down friction to the lowest possible point. One of the best ways of doing this is to use ball-type bearings wherever possible. Several types that can easily be assembled from existing Meccano parts have been described in "*Suggestions Section*" from time to time, and here is another that will be found useful in many different kinds of models.

The bearing is shown in Fig. 475, and consists essentially of a Road Wheel (Part No. 187), which forms the lower race, 14 Steel Balls (Part No. 117), and a 2½" Gear Wheel (Part No. 27c). The design of the base on which the bearing is assembled depends on the model in which it is incorporated. In the example shown the bearing is built up on two 3½" Angle Girders, each of which carries an Angle Bracket at its centre. The Road Wheel is fixed between the free arms of the Angle Brackets by Bolts screwed into its boss. A Rod is pushed through the hub of the Road Wheel and is fitted with an Aeroplane Collar, which is pressed against the face of the boss. The Road Wheel is also supported by four ¾" Bolts, which are pushed through the Angle Girders in the positions shown and make contact with the under surface of the Wheel. The Bolts are fixed in place by Nuts above and below the flanges of the Angle Girders. The Steel Balls are now placed in the rim of the Road Wheel and then a 2½" Gear forming the upper race is placed on the Rod in contact with them. The grub screw in the boss of the Gear is tightened up so that it grips the Rod.

A bearing of this type is particularly useful for supporting the booms of small hammerhead cranes, as it is possible to transmit driving motion to the boom by means of a Pinion meshing with the 2½" Gear.

We shall be glad to hear from readers who have experimented in the assembly of ball bearings and to learn of any novel ideas they have on this subject.

(476) A Useful Momentum Motor for Driving Small Models

(F. Schorrewegen, Lierre, Belgium)

Stationary Meccano models of a simple type such as drills and other machine tools can be driven by means of a momentum motor of the kind shown in Fig. 476. This consists of a heavy flywheel that can be rotated at high speed by turning a crank handle. The model is provided with two clutches, one of which enables the flywheel shaft to be disconnected from the handle, while the other couples it to the shaft of the model to be driven.

Front and back of the casing consists of 3½" × 2½" Flanged Plates, and its sides of 3½" × 2½" Flexible Plates strengthened by 3½" and 2½" Strips. It is divided into two portions by another 3½" × 2½" Flanged Plate bolted 1" from one end. 3½" and 4½" Angle Girders bolted together to form Reversed Angle Girders are bolted along each side of the casing.

A 3½" Rod is journalled in the centre top holes of gear-box as shown, and it carries at its inner end a Washer and a Compression Spring, a 57-teeth Gear 1, a Socket Coupling 2, a ½" Pinion 3 and a second 57-teeth Gear 4, arranged on the Rod in that order. The boss of the 57-teeth Gear 1 is gripped in one end of the Socket Coupling, and the other end of the Socket Coupling grips the boss of the ½" Pinion. The Socket Coupling and the gears, with the exception of the 57-teeth Gear 4, are free to revolve on the Rod. The outer end of the Rod is fitted with a built-up handle 8.

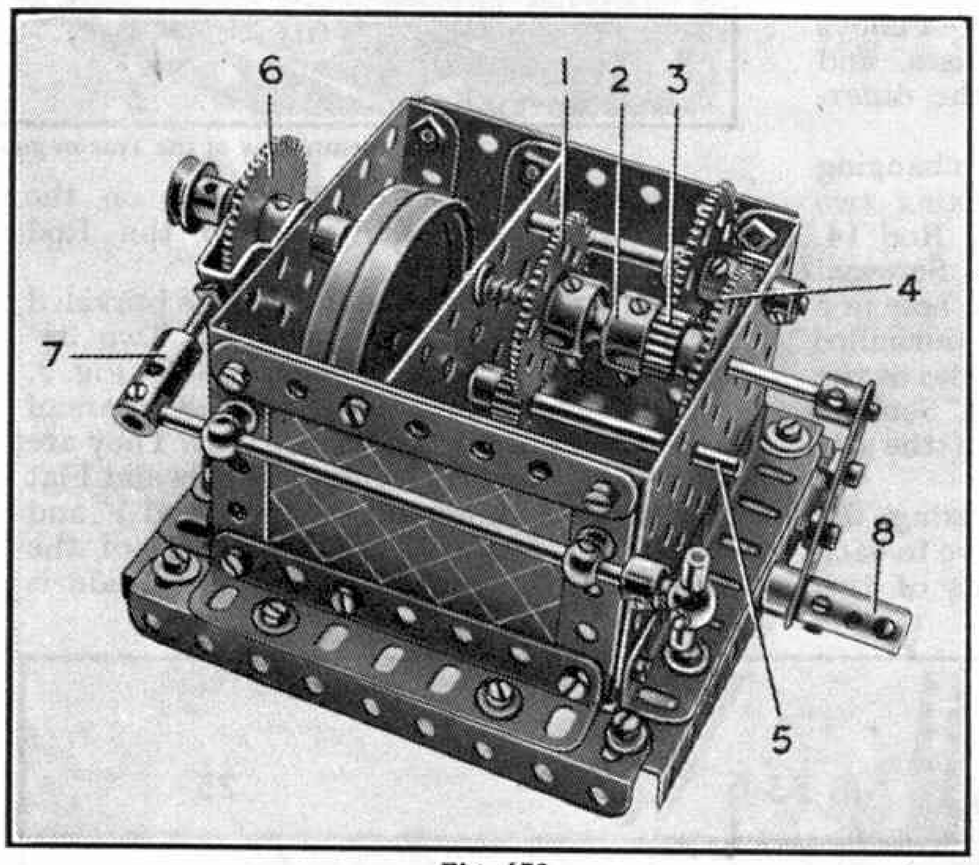


Fig. 476

A 2½" Rod also is journalled in the sides of the casing as shown. It carries a ½" Pinion that engages 57-teeth Gear 4, and a 57-teeth Gear that meshes with ½" Pinion 3.

The 57-teeth Gear 1 meshes with a ½" Pinion on a 4½" Rod 5. This Rod also carries a Flywheel and, outside the box, a ¾" Pinion. This Pinion meshes with a 50-teeth Gear 6 on a 2" Rod journalled in the side of the box and in a 2½" Strip bolted to a Flat Trunnion fixed to the base.

The 2" Rod carries a Cranked Bent Strip, between the arms of which is the 50-teeth Gear 6. This is spaced from the Cranked Bent Strip by two Washers. The Rod has a ½" fast Pulley on its outer end, and a Collar on its inner end. The Cranked Bent Strip is fixed by two Nuts to one end of a 1½" Screwed Rod, the other end of which is screwed into the bore of a Threaded Coupling 7. The Threaded Coupling is fixed on one end of a 4" Rod journalled in two Handrail Supports attached to the side of the casing, and on the other end of the Rod is a Handrail Coupling that carries a 1" Rod in its tapped bore to form a handle.

Suggestions Section

By "Spanner"

(477) Air Brake Governor

When using a Meccano Clockwork Motor it is often found necessary to apply a slight retarding force in order to increase the duration of the Motor's run, and this can be accomplished efficiently by the mechanism shown in Fig. 477.

The driving shaft of the Motor carries a Sprocket Wheel, which drives the model, and a 57-teeth Gear 1 that engages with a ½" Pinion. The Pinion is mounted on a 2" Rod fitted with a fan wheel 5, the blades of which are composed of 2½" Flat Girders attached by means of Angle Brackets to a central Bush Wheel.

The Flat Girders forming each vane should be covered on one side with a piece of paper. By this means air leakage through the holes is prevented, and full use is thus made of the resistance area available.

A fan brake of this kind can be fitted to any Clockwork Motor, and is useful not only for extending the time of run on one winding of the spring, but for reducing the Motor speed in the absence of suitable gears. In this case it is advisable to provide means by which the speed of the drive can be varied at will. The easiest method is to mount the vanes in such a manner that they can be turned on their axis so as to offer greater or lesser resistance to the air as required. The slowest speed of course will be obtained when the vanes are arranged in line with the shaft, and the highest speed when they lie at right angles to the shaft.

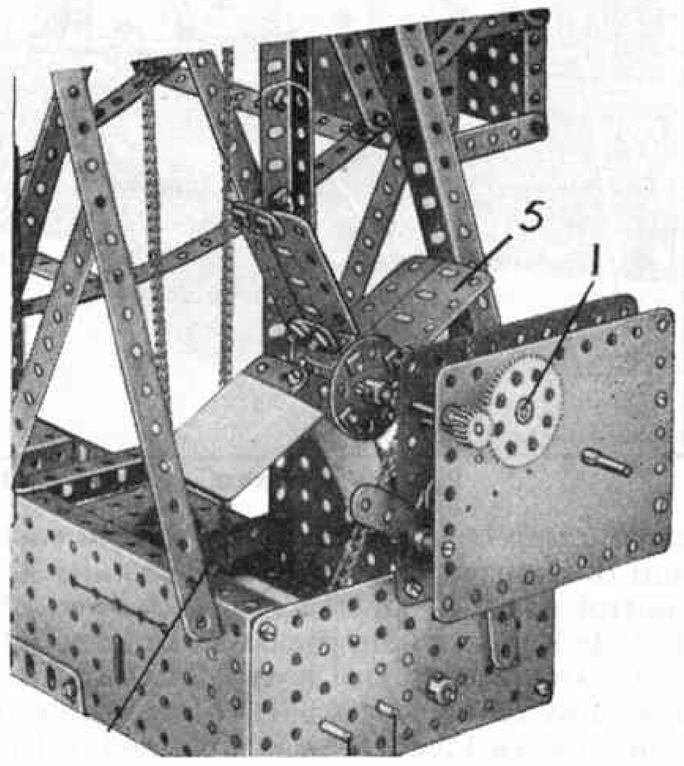


Fig. 477

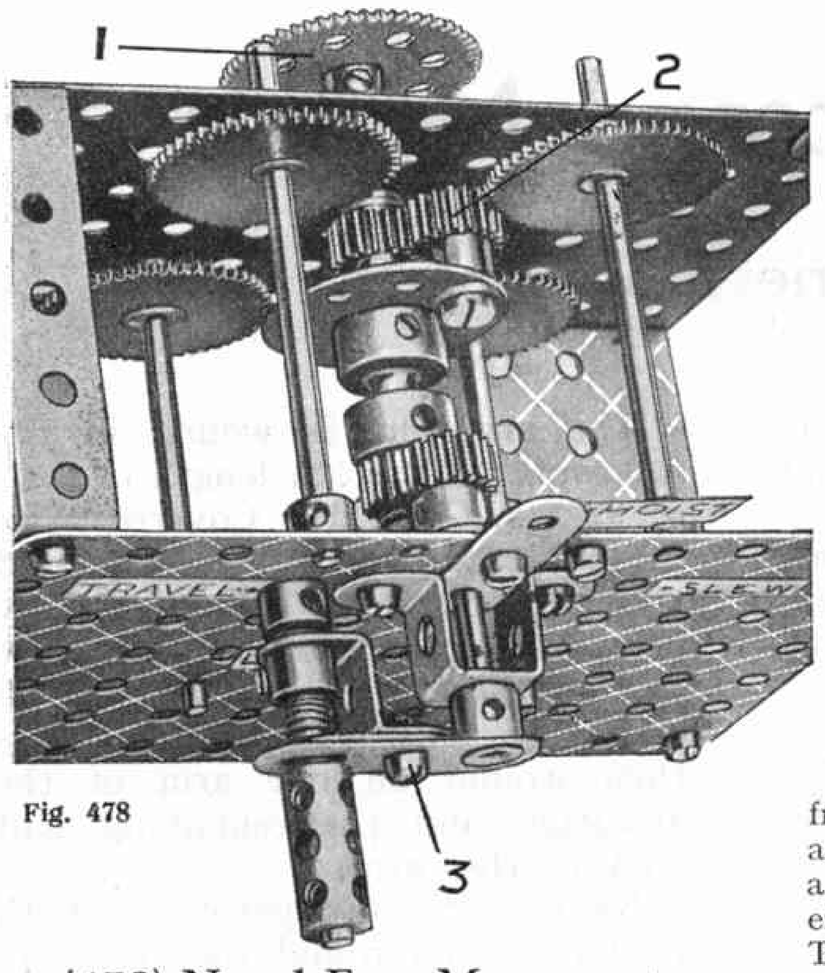


Fig. 478

(478) Novel Four-Movement Gear-Box

(G. Robinson, Leeds)

The usual method of obtaining two or more separate movements from one power unit, such as a Meccano Clockwork or Electric Motor, is to employ some form of gear-box so arranged that the desired movement may be connected up to the Motor by sliding certain gears into or out of mesh. The design of a gear-box for a crane, for example, in which there may be as many as four or even five separate motions to be driven from a single motor, is a task that requires much thought in order to produce a piece of mechanism that is both neat and capable of functioning in a reliable manner.

The alternative is to employ a separate motor for each motion, so as to avoid a complicated gear-box. This arrangement, although typical of the most up-to-date practice, is not likely to find favour with the majority of Meccano boys because of the number of motors required. What is wanted is a type of gear-box so designed that it may be put together easily, and will function efficiently, without any adjustment other than that met with in the ordinary course of model-building.

Fig. 478 shows a gear-box that fulfils these conditions in a remarkably ingenious manner. The device is arranged to supply four separate movements, one or more of which can be omitted if not required in the particular model in which the gear-box is incorporated.

The principle on which the gear-box is designed is as follows. A Pinion 2 is arranged so that on operation of the "selector" lever it may be moved bodily round another Pinion secured to the driving shaft, in the same way as the "planet" wheel travels round the "sun" wheel in epicyclic mechanism. The four separate shafts to be driven are arranged about the driving shaft, which carries the sun wheel, and they are fitted with 50-teeth Gears, each of which meshes with the planet wheel 2 when the latter is brought into position between it and the sun wheel. Thus the planet wheel forms a connecting link by means of which any one of the four driven shafts can be linked up as desired, with the driving shaft.

The sun wheel on the driving shaft is a $\frac{1}{2}''$ Pinion that is in constant mesh with a second $\frac{1}{2}''$ Pinion 2 forming the planet wheel. Pinion 2 is fixed to a Pivot Bolt carried in a Bush Wheel, and the latter is free to rotate independently of the driving shaft on which it is mounted. On turning the Bush Wheel the Pinion 2 may be brought into mesh at will with the 50-teeth Gears on the driven shaft.

The Bush Wheel is connected by a Socket Coupling to a $\frac{1}{2}''$ Pinion that is loose on the driving shaft and is engaged with a similar Pinion secured on the end of a short Rod carrying at its outer extremity a Crank 3. The Rod is journalled in a reinforced bearing comprising a Double Bent Strip bolted to the $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate that forms one side of the gear-box. The end of the Crank is provided with a spring loaded plunger that may be inserted, on rotation of the Crank, in certain holes in the Plate. These holes are marked in the illustration with the desired gear positions. The plunger is a short Rod free to slide in a Reversed Angle Bracket and a Flat Bracket bolted to the Crank, and a Compression Spring serves to keep the end of the plunger in the holes in the Plate. To change gear, it is only necessary to pull out the plunger and rotate the Crank until it is opposite the hole labelled with the movement required. The plunger is then released.

The drive from each of the Rods carrying the 50-teeth Gears may be conveyed by any suitable means to the particular movement it is intended to operate.

(479) Hypoid Drive for Model Motor Vehicles

(H. S. Everett, Wrotham)

Some modern motor cars are equipped with what is known as hypoid drive in the transmission to the wheel axles. In an ordinary bevel drive the crankshaft, gear-box and propeller shaft are in line with the centre of the crown wheel, and in many instances are level with or slightly nigher than the floor of the car. Metal covers known as shaft tunnels then have to be used to cover the revolving parts. In a hypoid drive, which is a form of bevel gear, the teeth engage considerably below the line passing through the centre of the crown wheel. With it the propeller shaft therefore can be carried lower down and the floor of the car can be quite flat.

Specially cut spiral bevels are used in actual hypoid gearing, but a good representation of a hypoid drive can be reproduced in Meccano by using the $\frac{1}{2}''$ Helical Gear (Part No. 211a) and the $1\frac{1}{2}''$ Contrate Wheel (Part No. 28). Fig. 479 shows an arrangement of this kind suitable for twin axle drive, which was suggested by H. S. Everett, Wrotham, Kent. It comprises two similar units, one for each axle. These are carried on the propeller shaft, and each consists of a Coupling 1, free on the propeller shaft, to which a second Coupling 2 is fixed by means of two Pivot Bolts 3. A $\frac{1}{2}''$ Helical Gear 4 secured on the propeller shaft engages a $1\frac{1}{2}''$ Contrate 5 fixed on a Rod 6 carried freely in the centre transverse hole in Coupling 2. Rod 6 is prevented from moving endways in the Coupling by means of two Collars fixed on the Rod, one on each side of the Coupling. The Coupling 1 is retained on the propeller shaft by a Collar. A Universal Coupling 7 is provided for connection to the gear-box driving shaft.

A mechanism of this kind is very smooth and silent in operation and when incorporated in a model vehicle greatly increases its interest.

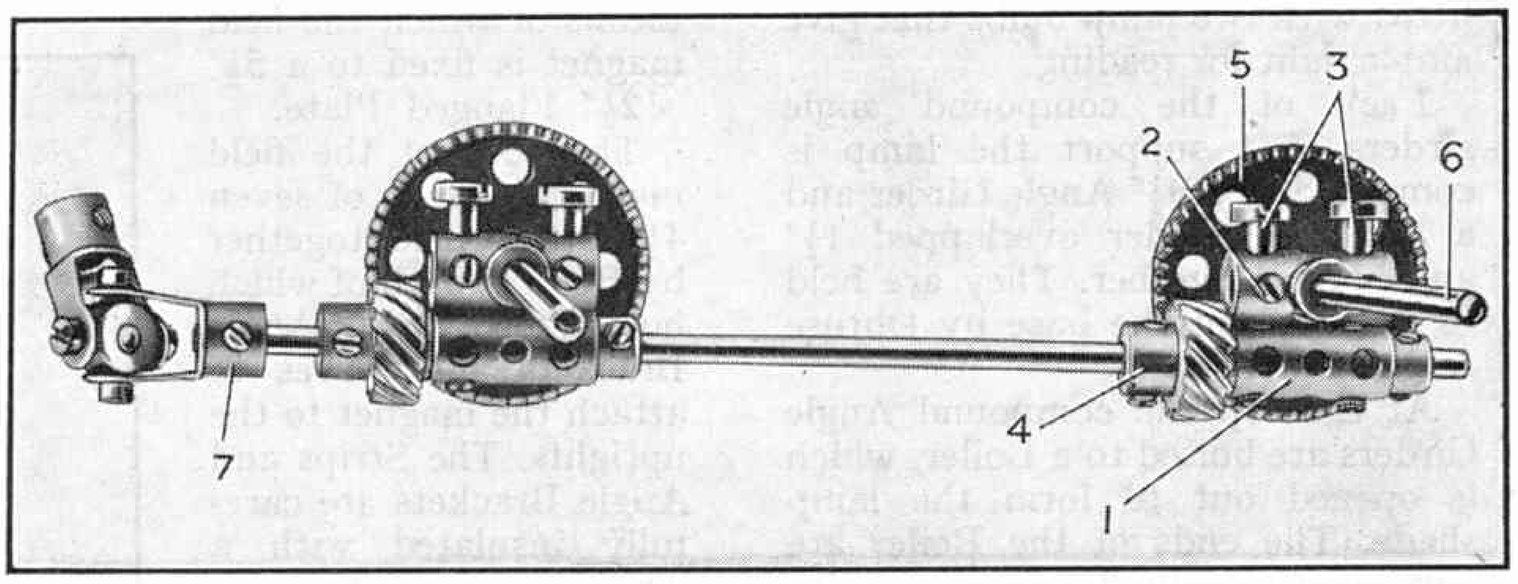


Fig. 479

Miscellaneous Suggestions

Under this heading "Spanner" replies to readers who submit interesting suggestions regarding new Meccano models or movements that he is unable to deal with more fully elsewhere. On occasions he offers comments and technical criticisms that, he trusts, will be accepted in the same spirit of mutual help in which they are advanced.

(**M.221.**) In cranes in which multi-sheave Pulley Blocks are used it is essential that the hoisting cord should always remain taut, for if it is allowed to become slack it is likely to slip off the pulleys. When the pulley block reaches the ground the hoisting barrel should immediately cease paying out, but if the operator is unable to see the ground a short interval may elapse before he applies the brake.

An ingenious method of showing when the hook is relieved of its load, and at the same time keeping the cord taut if the drum pays out a little too rapidly, consists of an Axle Rod pivoted near the centre to the jib and carrying at its lower end a Worm or other suitable weight. An End Bearing at the upper extremity of the Rod carries a $\frac{1}{2}''$ loose Pulley. The hoisting cord passes over the Pulley and the weight of the load hook should be sufficient to hold the lever in a position almost parallel to the jib. As soon as the hoisting cord is relieved of its weight when the Pulley block reaches the ground, the Worm at the end of the lever returns it to the vertical position, thus taking up the slack in the cord and giving the crane operator ample warning to apply the brake.

(**M.222.**) In the construction of gear mechanism the necessity occasionally arises for a small internally toothed gear, and as such a part is not yet included in the Meccano range readers will be interested in learning how a novel substitute can be devised. A $1\frac{1}{2}''$ Bevel Gear is used and a $\frac{1}{2}''$ Pinion is placed so that it meshes with the inner edges of the Bevel teeth.

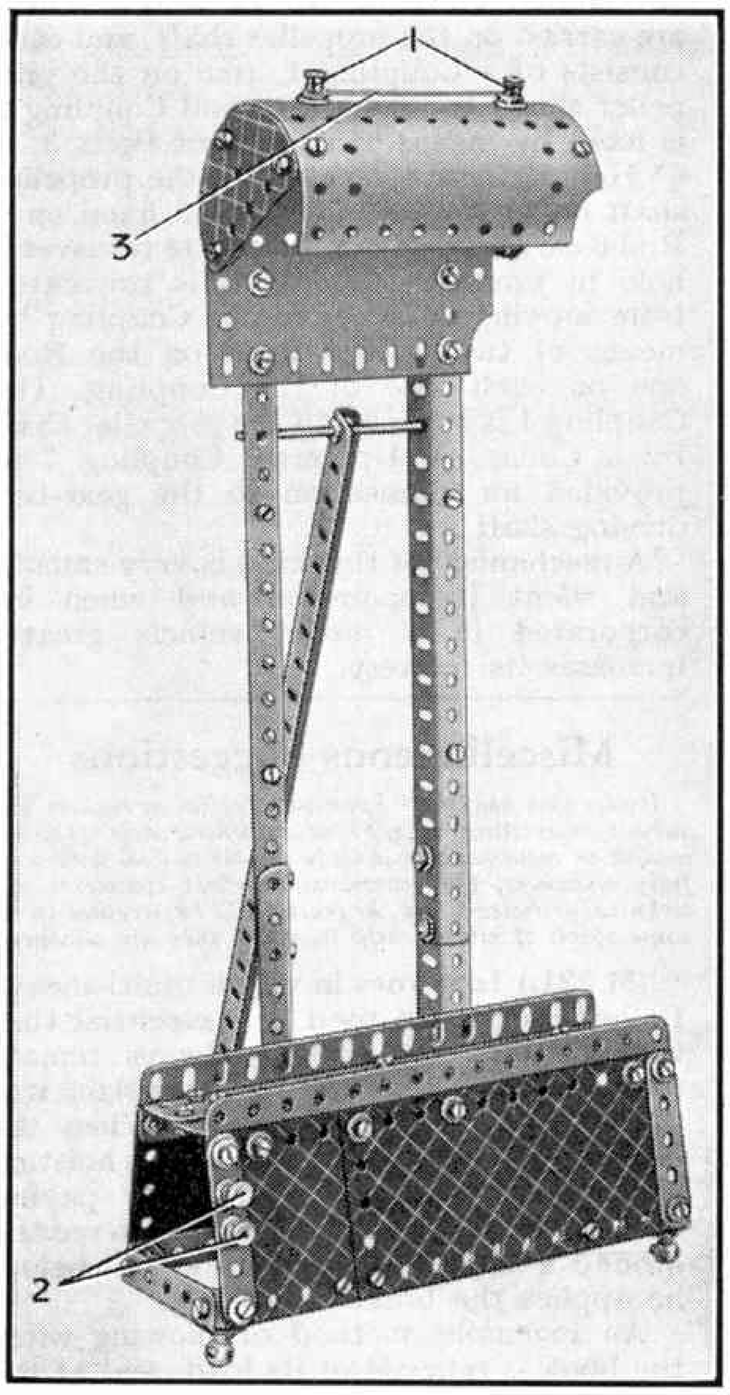


Fig. 1. A useful illuminated book rest.

New Meccano Models

A Fine Variety of Subjects

THE first of three fine models we are describing this month is the illuminated book rest shown in Fig. 1. It is designed to accommodate the "*Meccano Magazine*," and is fitted with two lamp bulbs that give ample light for reading.

Each of the compound angle girders that support the lamp is composed of a $9\frac{1}{2}''$ Angle Girder and a $3''$ Angle Girder overlapped $1\frac{1}{2}''$ and bolted together. They are held to the back of the base by Obtuse Angle Brackets.

At the top the compound Angle Girders are bolted to a Boiler, which is opened out to form the lamp shade. The ends of the Boiler are partly enclosed by $2\frac{1}{2}''$ Semi-Circular Plates, each of which is held to the Boiler by three Angle Brackets. Two Lamp Holders are bolted by 6 B.A. Bolts to the Boiler to hold the bulbs, Insulating Bushes and Washers being placed on the shanks of the Bolts to insulate them from the Boiler. A Terminal 1 is screwed on the shank of each Bolt, and each Lamp Holder is fitted with a 3.5-volt Bulb.

Two Terminals 2 are attached to the left-hand side of the front of the base, but are insulated from it by means of Insulating Bushes and Washers. The Terminals 1 are connected by an insulated wire 3, one end of which is then led to one of the Terminals 2. Another wire connects the cases of the Lampholders, and a lead is taken from this wire to the second Terminal 2.

Parts required to build the book rest: 2 of No. 1b; 4 of No. 5; 1 of No. 8; 2 of No. 8a; 2 of No. 9c; 2 of No. 9d; 16 of No. 12; 2 of No. 12c; 66 of No. 37; 4 of No. 37a; 36 of No. 38; 1 of No. 80c; 4 of No. 103k; 1 of No. 126; 2 of No. 136; 1 of No. 162b; 8 of No. 192; 2 of No. 183; 2 of No. 190; 2 of No. 192; 2 of No. 214. 4 B.A. Bolts and Nuts, 4 Terminals.

An electric motor that can be built entirely from standard Meccano parts is shown in Fig. 2. The model will not produce much power, but its construction is extremely interesting and serves to demonstrate the underlying principles of an electric motor.

The construction of each side of the motor field magnet is commenced by bolting together six Curved Strips interleaved with four $2\frac{1}{2}''$ Strips and two $2''$ Strips, using the $\frac{3}{4}''$ Bolt 1. The lower ends of the Curved Strips are spaced apart by Washers placed on the Bolts 2 and 3. The Bolts 2 hold also two $1'' \times \frac{1}{2}''$ Angle Brackets, by means of which the field magnet is fixed to a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate.

The core of the field magnet consists of seven $4\frac{1}{2}''$ Strips held together by Bolts x, each of which holds also two Angle Brackets and serves to attach the magnet to the uprights. The Strips and Angle Brackets are carefully insulated with a wrapping of stout paper. The winding consists of about 500 turns of 26 S.W.G. Cotton Covered Wire.

The armature consists of two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Double Angle Strips laid back to back, with the $4\frac{1}{2}''$ Rod 5 secured centrally between them. The Strips are bound with adhesive tape to retain them in position and to prevent their edges from damaging the insulation of the winding.

The armature is wound in the following manner. A length of 6 ft. of 23 S.W.G. Cotton Covered Wire is doubled to find the centre, and the wire is then laid diagonally across the centre of the armature so that there is an equal length on each side. One half of the wire is then wound on one arm of the armature and the remaining half on the other arm.

Next a strip of paper coated with gum is wound round the armature shaft until a sleeve about $\frac{1}{8}''$ thick is formed on the Rod 5. Each end of the armature coil is now uncovered and shaped to form an elongated U. The two shaped ends of the wire form the commutator segments, and should be bound to the paper sleeve with cotton. One of these segments is shown at 6; the other is on the opposite side of the paper sleeve.

The armature is clamped on the Rod 5 by two $\frac{3}{4}''$ Contrate Wheels 9, which press tightly against the Double Angle Strips. The ends of the Double Angle Strips are rounded so that they rotate freely in the armature tunnel.

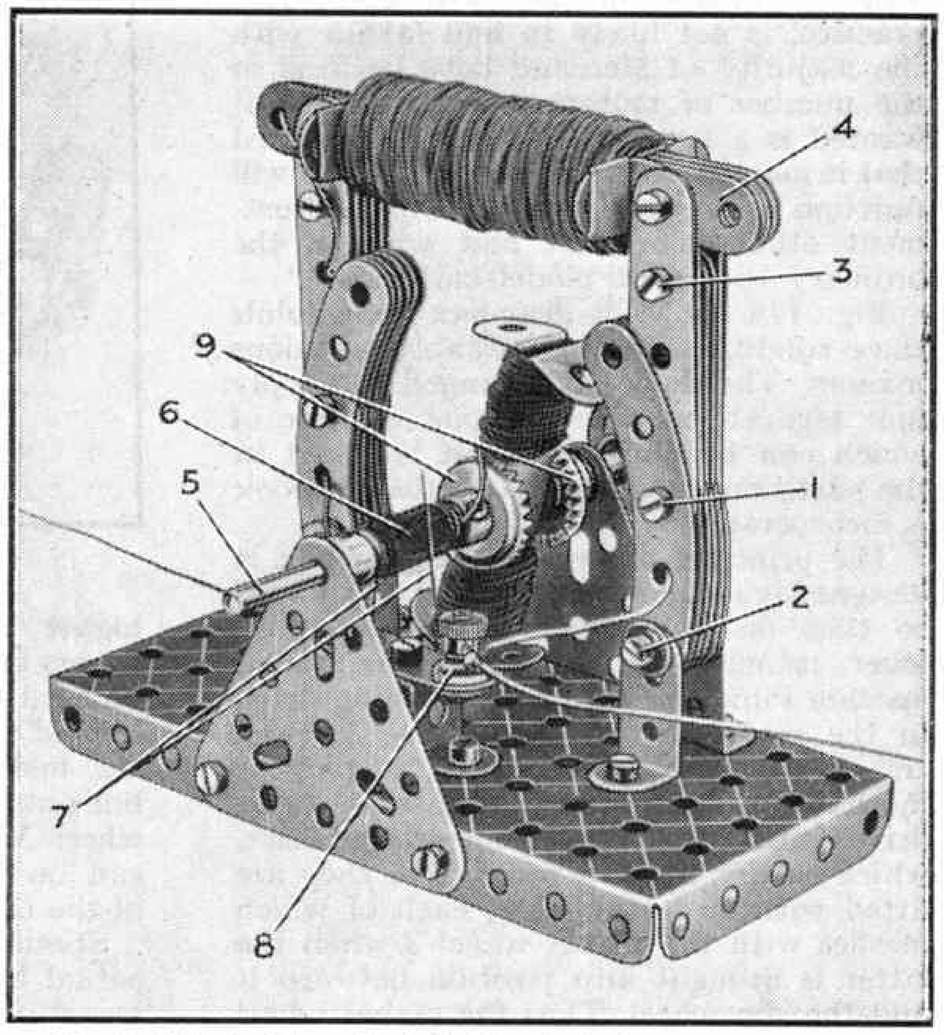
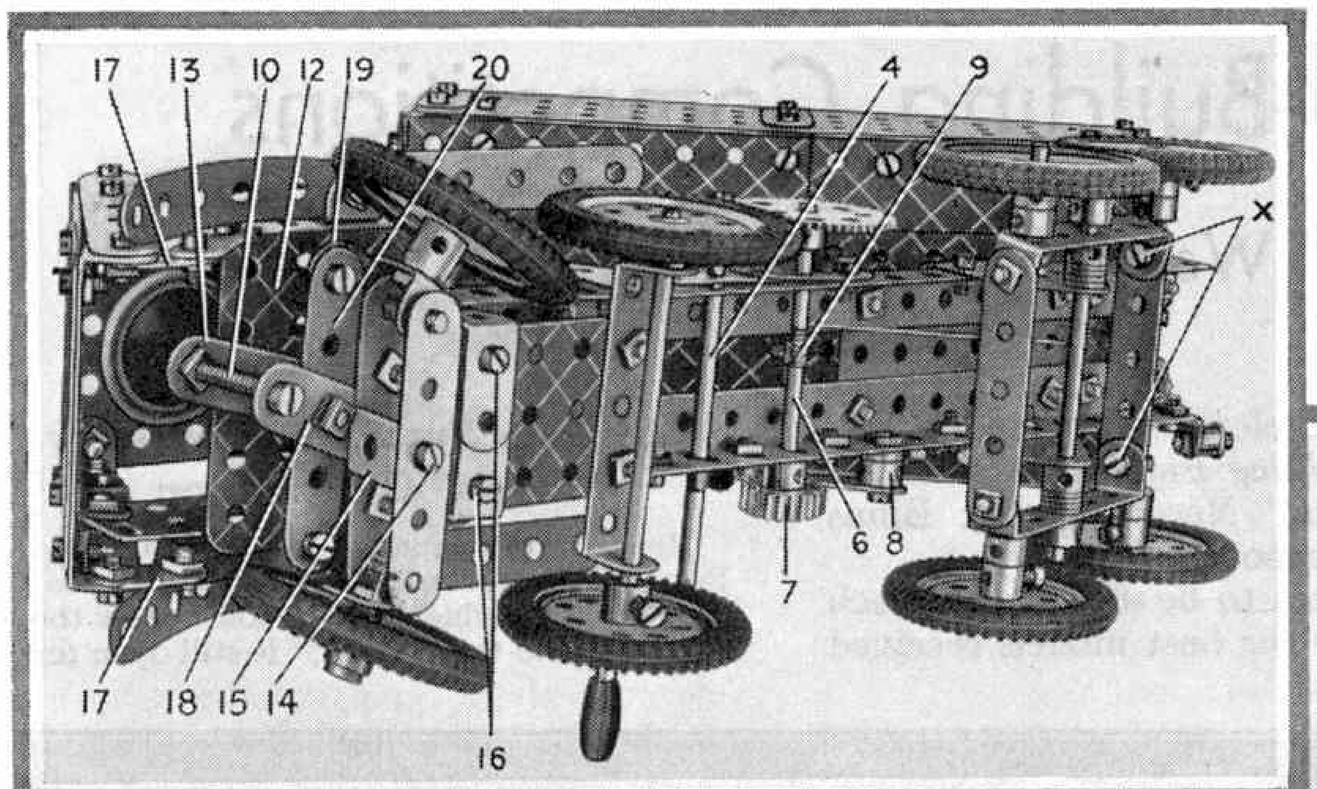


Fig. 2. This electric motor is built entirely from Meccano parts.

Each of the brushes 7 consists of a



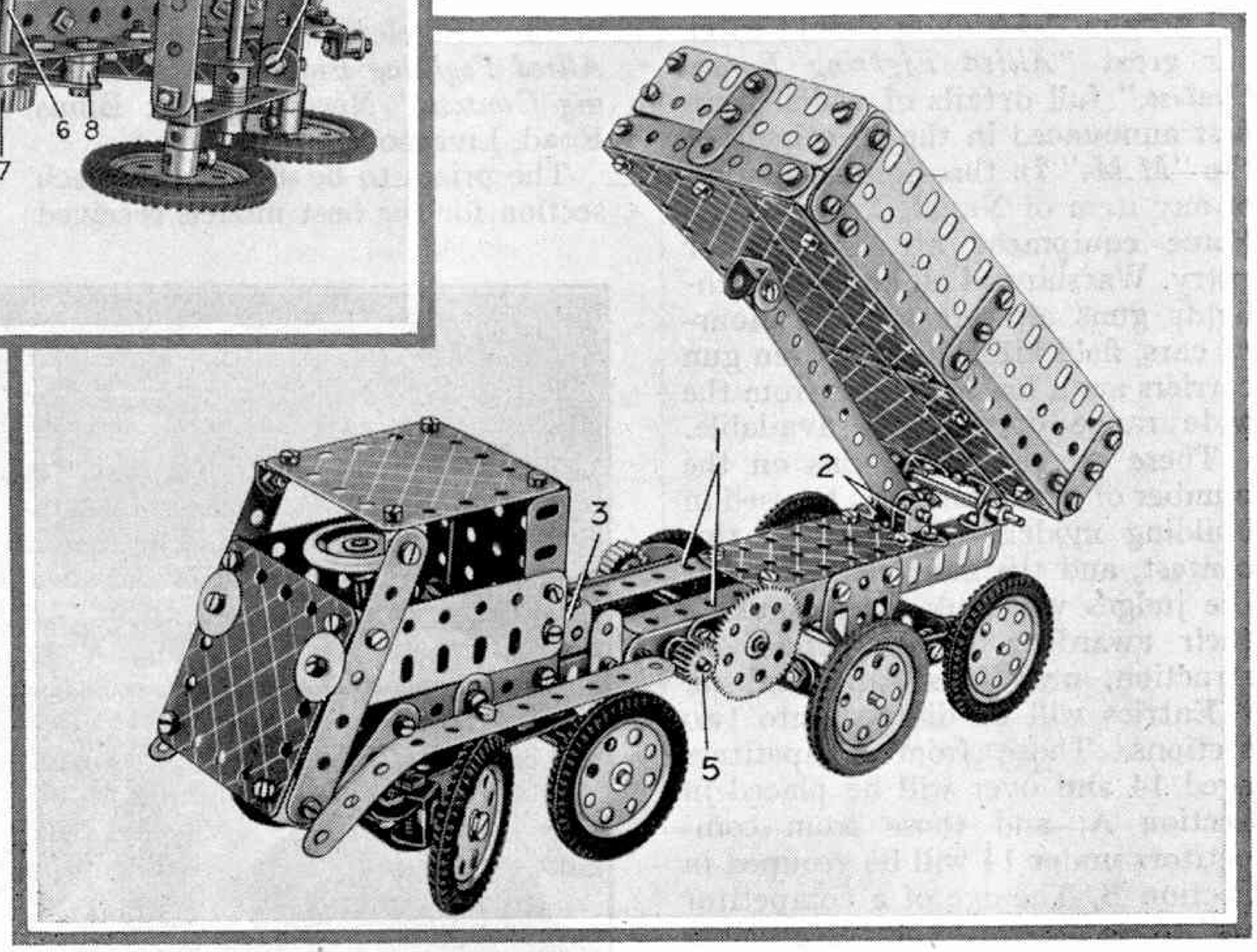


Fig. 3. The illustration on the right shows a fine tipping lorry fitted with articulated axles. An underneath view of the chassis and its mechanism is seen above.

length of 23 S.W.G. bare copper wire, which is connected to an insulated Terminal 8 and arranged to press lightly on the commutator.

The ends of the field coil are connected to the Terminals 8, each of which is fixed in a $1\frac{1}{2}''$ Strip bolted to a Double Bent Strip. Both Terminals are insulated from the Strip by Insulating Bushes and Washers. The ends of the wires from the Transformer or accumulator are also attached to these Terminals.

As the motor is of the two-pole type it will probably be necessary to twist the shaft 5 with the fingers to start it.

Parts required to build electric motor: 7 of No. 2a; 8 of No. 5; 4 of No. 6; 1 of No. 6a; 4 of No. 12; 4 of No. 12b; 1 of No. 15a; 1 of No. 22; 2 of No. 29; 11 of No. 37; 26 of No. 38; 1 of No. 45; 2 of No. 48a; 1 of No. 32; 1 of No. 59; 2 of No. 76; 12 of No. 90; 8 of No. 111; 4 of No. 182; Wire, 2 B.A. Bolts, Nuts and Terminals.

The eight-wheeler tipping lorry of which two views are shown in Fig. 3, is a splendid subject for the great army of model-builders who are specially interested in wheeled vehicles.

The chassis consists of two $9\frac{1}{2}''$ Angle Girders 1, joined by a $3'' \times 1\frac{1}{2}''$ Perforated Flat Plate, and also by a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Perforated Flat Plate. The second of these Plates forms the floor of the cab, and is so arranged that it projects $\frac{1}{2}''$ at each side and $1\frac{1}{2}''$ at the front. Two Flat Trunnions are bolted to the sides of the chassis 2″ from the rear, and two Angle Brackets 2 and two other Angle Brackets, in which the body pivots, also are bolted in position at the rear of the chassis, as shown in the illustrations.

The four rear wheels are mounted in a pivoted bogie made up as follows. Two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips are bolted at their ends to two $2\frac{1}{2}''$ Strips to form a square frame. Two $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets are attached to two of the corners of the frame by the Bolts x, and they provide bearings for the rearmost of the rear axles.

The front wheels are mounted in a pivoted frame consisting of a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Perforated Flat Plate that pivots on two $1'' \times 1''$ Angle Brackets 16. A 2″ Rod is pushed through the front holes of the chassis side girders and through the Angle Brackets, and is held in place by a Collar on each end of it. The rearmost of the two front wheel axles is journalled in a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip bolted along the rear end of the Plate, as shown in Fig. 3. A $2\frac{1}{2}''$ Strip is bolted along the front of the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flat Plate. Then a Double Bent Strip 15 is bolted with one of its arms protruding under the Plate, and a $2\frac{1}{2}''$ Strip 14 is bolted to its other arm. Each end of the $2\frac{1}{2}''$ Strip 14 carries a Double Bracket. A 1″ Screwed Rod is pushed through the lower arm of the Double Bracket and through the slotted hole of the Flat Bracket 19. A Nut is then placed on the lower end of the Rod outside the Double Bracket, and a second Nut above the Flat Bracket.

The Rod is pushed through the lower $2\frac{1}{2}''$ Strip, the other arm of the Double Bracket and the upper $2\frac{1}{2}''$ Strip 14. The two Nuts on the Rod are tightened so as to clamp the Flat Bracket and the Double Bracket firmly together. A $2\frac{1}{2}''$ Strip 2 is lock-nutted at each end in the round holes of the two Flat Brackets.

A $1\frac{1}{2}''$ Strip 18 is lock-nutted through its centre hole to the $2\frac{1}{2}''$ Strip 20 and also to the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flat Plate as shown in the illustration. The steering wheel is mounted on a 2″ Rod and is fitted with a Crank at its lower end. A $1\frac{1}{8}''$ Bolt 10 connects the Crank with Strip 18.

The mechanism by which the body is tipped is simple. A $5\frac{1}{2}''$ Strip is fitted at one end with a 1″ Corner Bracket, and is pivoted on a 1″ Rod passed through Angle Brackets 2. The other end of the Strip carries a Double Bracket. A $3\frac{1}{2}''$ Crank Handle is journalled in the middle holes of the $1\frac{1}{2}''$ Strips bolted to the sides of the chassis. It carries a $\frac{1}{2}''$ Pinion 5 meshed with a 57-teeth Gear on a 3″ Rod 6, a Cord Anchoring Spring and a Ratchet. A length of Cord is tied to the Spring and to the Corner Bracket.

Parts required for eight-wheeled tipping lorry: 2 of No. 1d; 3 of No. 2; 4 of No. 3; 7 of No. 5; 17 of No. 6a; 2 of No. 8a; 2 of No. 9a; 4 of No. 10; 6 of No. 11; 27 of No. 12; 2 of No. 12a; 2 of No. 15b; 2 of No. 16; 2 of No. 16a; 1 of No. 17; 1 of No. 18d; 1 of No. 19g; 8 of No. 21; 1 of No. 22; 1 of No. 26; 1 of No. 27a; 2 of No. 35; 150 of No. 37a; 135 of No. 37b; 11 of No. 38; 1 of No. 40; 42 of No. 48a; 16 of No. 59; 1 of No. 62; 2 of No. 72; 2 of No. 73; 24 of No. 82; 2 of No. 103k; 2 of No. 103d; 2 of No. 103e; 1 of No. 111c; 1 of No. 111a; 1 of No. 120a; 2 of No. 126a; 3 of No. 133a; 8 of No. 142a; 1 of No. 147c; 3 of No. 147b; 1 of No. 148; 1 of No. 155a; 1 of No. 176; 2 of No. 190; 2 of No. 190a; 2 of No. 192; 2 of No. 217b

Meccano Model-Building Competitions

Prizes for Model Warships, Guns, Aircraft

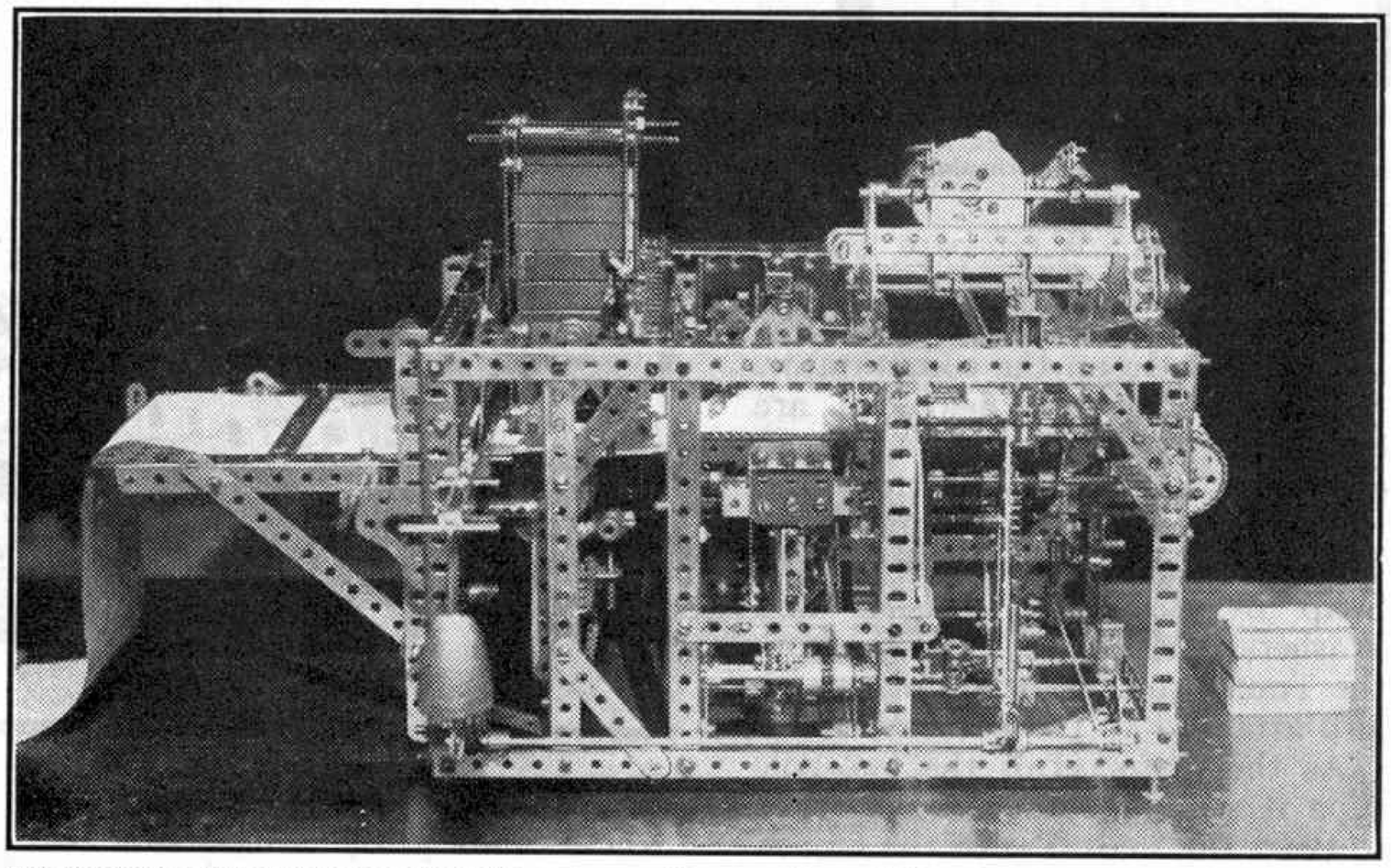
Every model-builder should enter our great *"Allied Fighting Forces Contest,"* full details of which were first announced in the May issue of the *"M.M."* In this Contest models of any item of Naval, Army or Air Force equipment are eligible for entry. Warships of all kinds, searchlights, guns, aircraft, tanks, armoured cars, field kitchens and Bren gun carriers are a few examples from the wide range of subjects available.

There are no restrictions on the number of parts that may be used in building models for entry in this contest, and the main features that the judges will look for in making their awards will be sound construction, neat finish and realism.

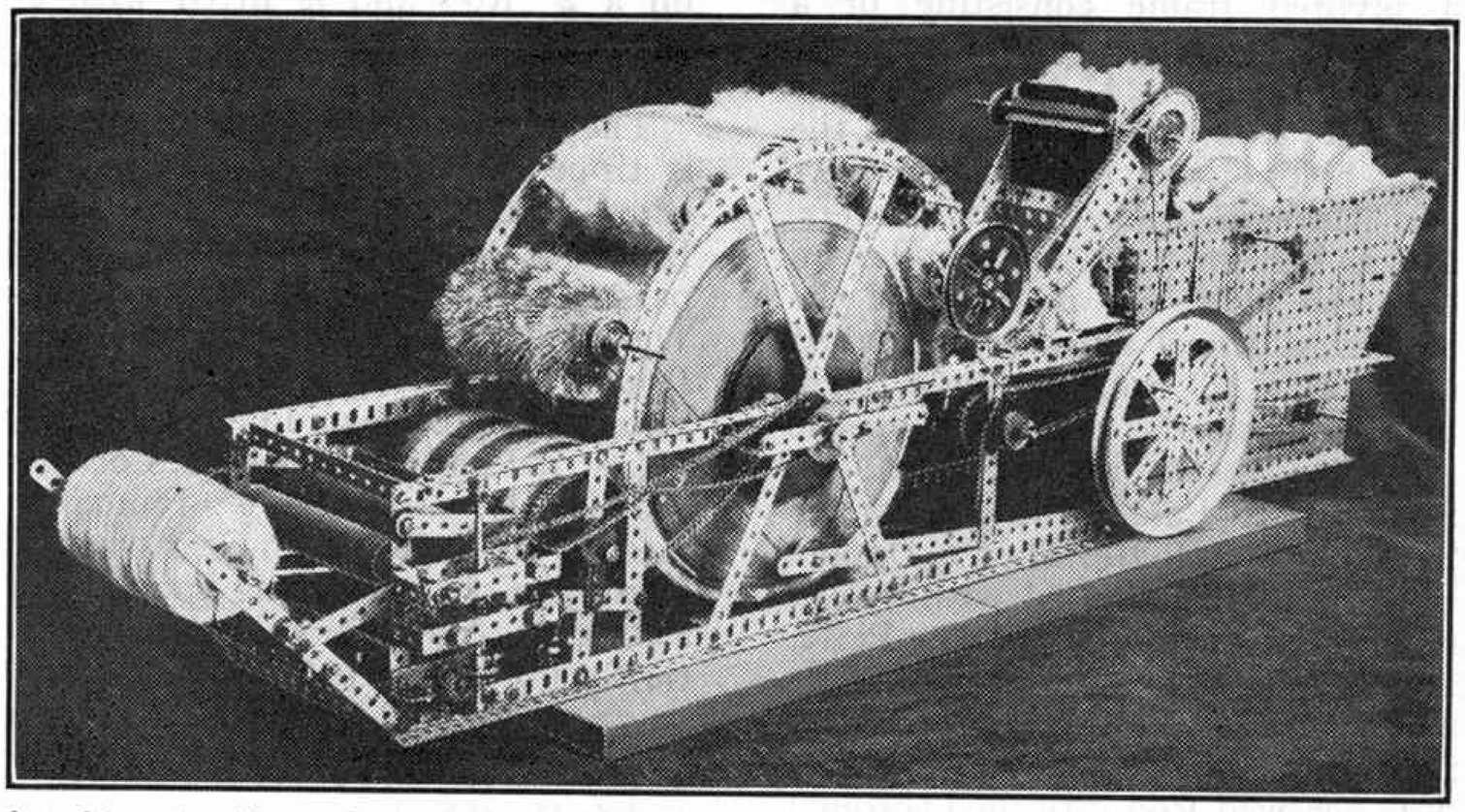
Entries will be divided into two sections. Those from competitors aged 14 and over will be placed in Section A; and those from competitors under 14 will be grouped in Section B. The age of a competitor will be taken into consideration in deciding the merits of his work.

After the model is built, a suitable illustration of it must be prepared. This may be either a good photograph or a drawing, but a photograph is best if it is possible to obtain one. The competitor should write his age, name and address on the back of the photograph or drawing, which should then be enclosed, together with a brief description of the model, in an envelope addressed *"The Allied Fighting Forces Model-Building Contest,"* Meccano Ltd., Binns Road, Liverpool 13.

The prizes to be awarded in each section for the best models received are: First Prize, Cheque for £3/3/–; Second, Meccano or Hornby products value £2/2/–; Third, products value £1/1/–. There will be also 10 prizes value 10/6 each and 10 of the value of 5/– each.



This intricate model will wrap small tablets or boxes with paper. It was built and designed by Gerrit van der May, Lisse, Holland, who is totally blind.



A model wool carding engine, one of several model textile machines built by Mr. A. Lord, Petersham, Australia.

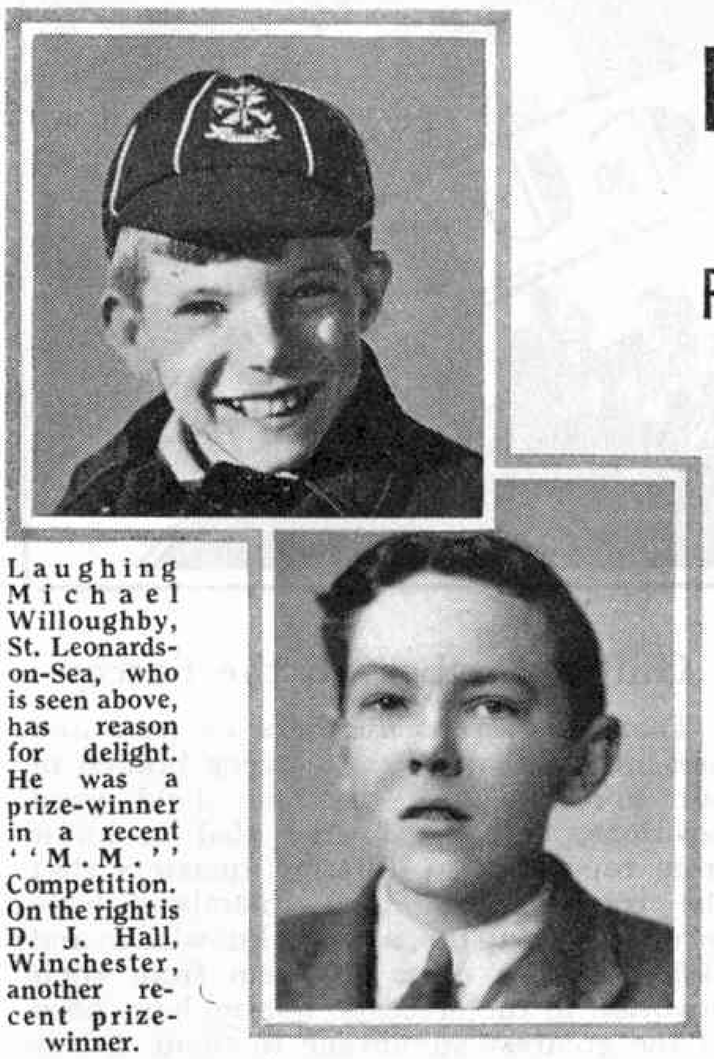
"Meccano Puzzles and Mystery Models" Competition

Readers are reminded that the "Meccano Puzzles and Mystery Models" Competition, full details of which were published in the April issue of the *"M.M.,"* is still open for entries. The closing date of the Contest is 29th June, so that intending competitors who have not yet sent in their entries should lose no time in preparing illustrations of their models.

The contest is open for mystery models and puzzle devices, the action of which is not readily apparent. An example of the type of entry suitable is a child's money box fitted with a lid that can be opened only by pressing or moving a particular Strip, Bolt or other Meccano part incorporated in its construction. A combination lock, or a trick puzzle in which one of several Strips connected by a string tied in a certain manner has to be removed without cutting the string, are other examples of suitable devices for entry in this Contest.

A First Prize consisting of Meccano or Hornby products to the value of £3/3/– will be awarded to the sender of the most ingenious mystery model or puzzle submitted, and there will be a Second Prize of products value £2/2/– and a Third Prize of products value £1/1/– for the next best models in order of merit. In addition there will be five prizes of products value 10/6 and five consolation awards value 5/–.

Competitors should send in clear photographs of drawings of their models together with a description of its construction and method of working. Actual models must not be sent. Entries should be addressed *"Puzzles and Mystery Models Contest,"* Meccano Ltd., Binns Road, Liverpool 13.



Laughing Michael Willoughby, St. Leonards-on-Sea, who is seen above, has reason for delight. He was a prize-winner in a recent "M.M." Competition. On the right is D. J. Hall, Winchester, another recent prize-winner.

Prize-Winning Meccano Models

By "Spanner"

Further Successful Entries in the "Winter" Contest

AMONG the chief prize-winning models in Section A of the "Winter" Contest that I was unable to describe last month is a fine swing bridge constructed by L. W. Chitty, Kingston. The model is nearly 7 ft. long, and is an excellent example of the use of Meccano parts in structural model-building. The swivelling centre span is 4 ft. 8 in. long, and is rotated on its axis by an E20B Electric Motor that operates through a two speed gear-box of a simple but efficient type. The lower of the two gear ratios provided allows the span to be manœuvred slowly into correct alignment with the approach spans when the bridge is being closed.

Many model-builders concentrate on subjects such as motor vehicles, locomotives and cranes, which offer scope for novel movements and mechanisms. There is plenty of interest in the building of bridges, however, especially one of an opening type. The construction of such models is not only a good test of a knowledge of girders and their uses, but of ability to carry out neat and careful work.

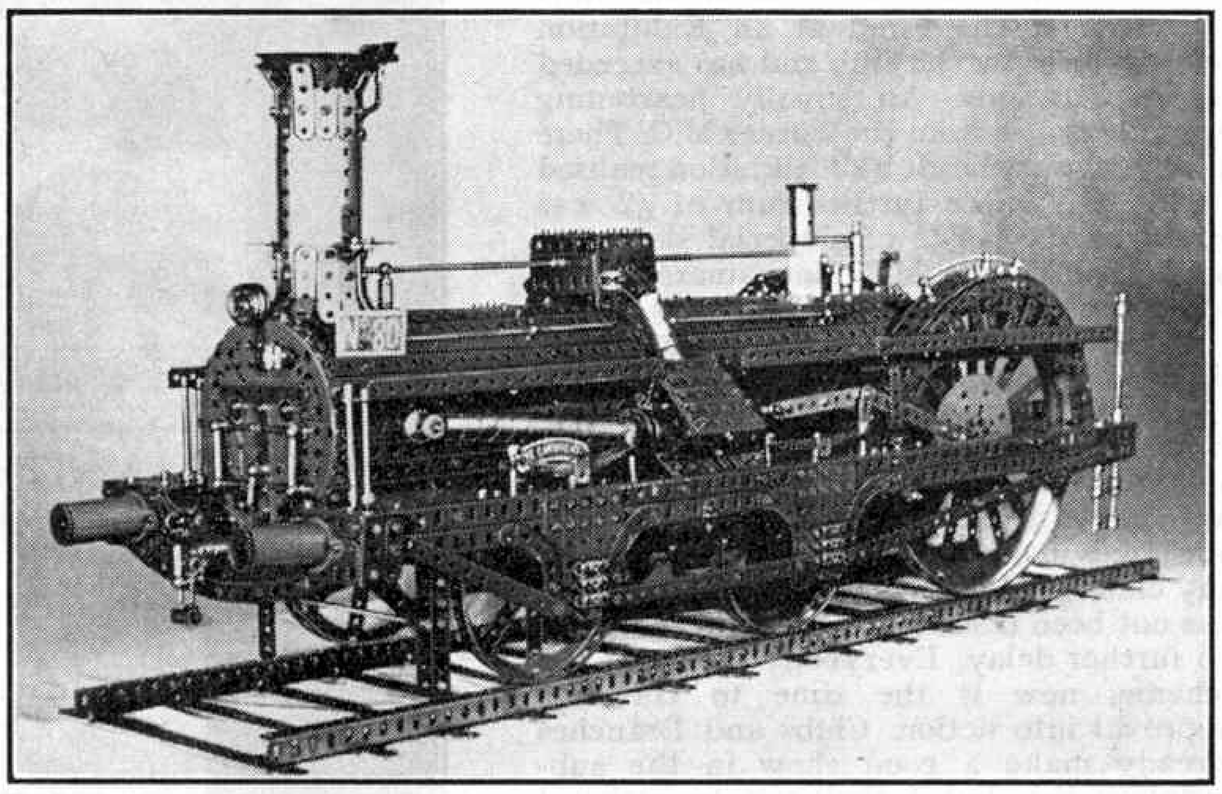
J. Matthews, Coventry, struck a topical note with a large and well equipped model of a "Pool" petrol tank wagon, which is shown in the illustration below. In addition to particularly neat construction of the tank and chassis, the model is noteworthy on account of the minute detail work incorporated in the cab. Another excellent feature is the realistic appearance of the six wheels. These consist of 3" Pulleys fitted with Road Wheels and Wheel Discs. The formation of the word "Pool" on the tank sides is carried out by means of Curved Strips and Strips.

I always expect neat and careful workmanship from this competitor, and the petrol lorry fully maintains the standard he has achieved in past contests. I recommend model-builders to study the illustration carefully, for there are many constructional details in the model that they will find useful for incorporation in their own work.

A scale model of an early narrow gauge American locomotive was sent by P. R. Wickham, Leicester. It represents one of two 0–4–4 type locomotives that ran in 1877 over the Billerica and Bedford narrow gauge railroad, Massachussetts. The engines were named *"Ariel"* and *"Puck,"* and they always ran bunker foremost as though they were 4-4-0's! Wickham's model is 20 in. long and 9 in. high and runs on 1¾ in. gauge track. It is fitted with working valve gear and full external details, all of which are reproduced as closely as possible to scale. The model was built from the contents of a No. 8 Outfit and a few extra parts.

E. D. Clements, Orpington, also won a prize with a model of an early locomotive. This time it was a model of a French locomotive of the Crampton class, and was based on an illustration of a locomotive of this type that appeared on page 723 of the *"M.M."* for December 1935. Comparison of that illustration with the photograph of the model reproduced on this page will show how closely the features of the actual engine are reproduced.

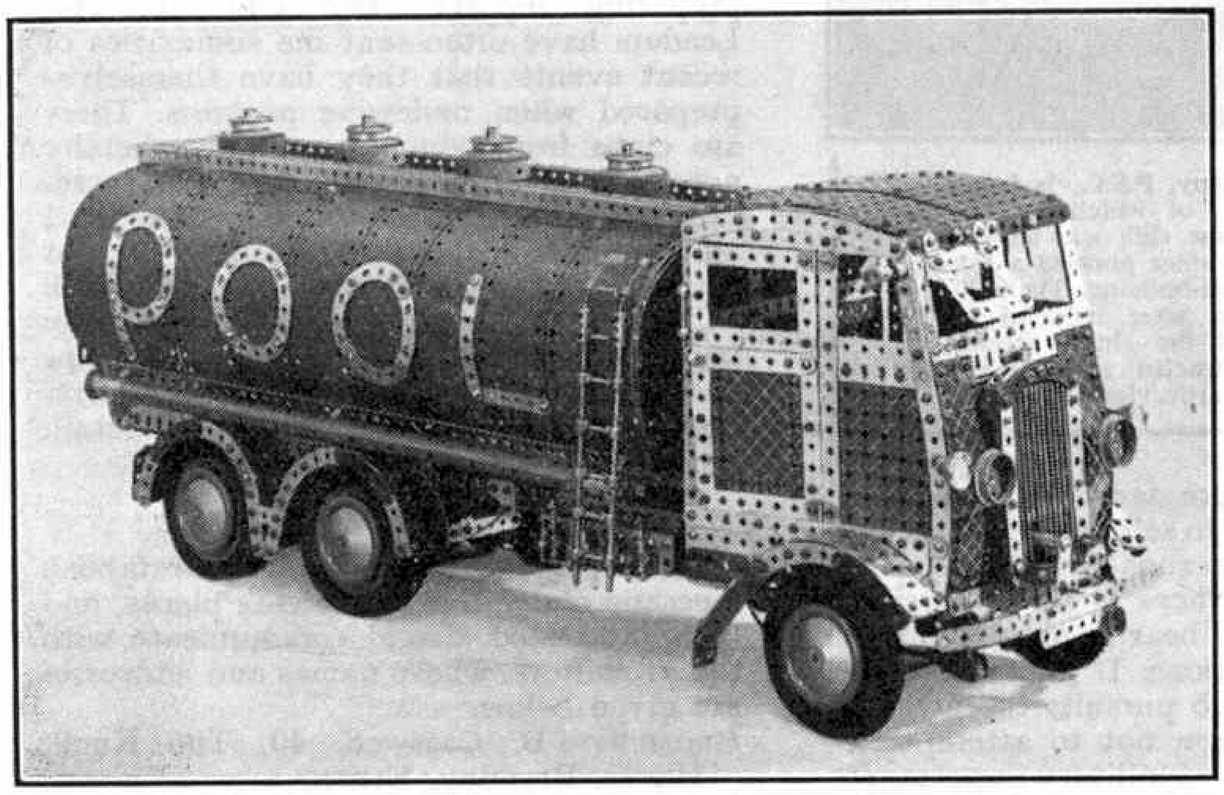
Military and naval equipment naturally formed the subjects of many models entered in this contest, and I mentioned some of these in my commentary last month. Second Prize in Section B was awarded to Michael Gainsborough-Waring, London, for a model of a "Tribal" class destroyer. This is distinguished for its realistic outline and the care taken to ensure correct proportions in the various items of deck equipment, guns and torpedo tubes. The characteristic outline of the actual vessel is due largely to its funnels, the fore funnel being of a much larger diameter than the aft funnel. In the model the first of these is represented by a Boiler and the second by two Sleeve Pieces placed end to end, and the effect is quite good.



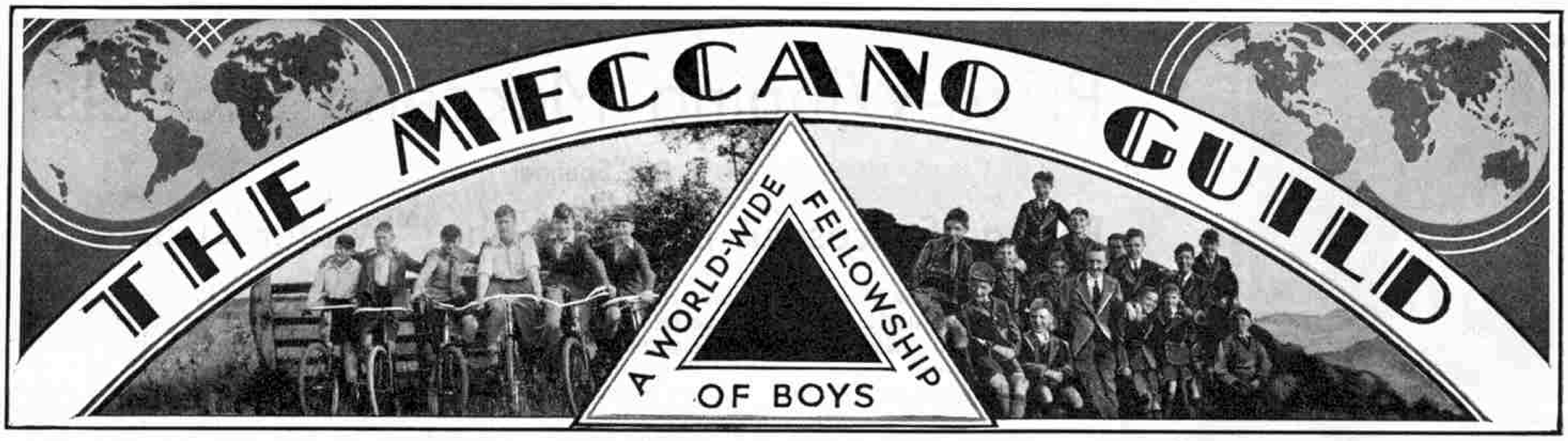
A Meccano version of "Le Continent," an early French locomotive, by E. D. Clements, Orpington.

Another excellent model of a military type was a cruiser tank built by K. G. Chettleburgh, Leicester, who won Third Prize in Section B. The model is well designed and constructed, but its realism is spoiled by creeper tracks formed from Sprocket Chain. These are not in scale with the other parts of the model, but due allowance was made for the probability that Chettleburgh lacked sufficient Strips or other suitable parts for building up tracks more in keeping with the size of the model.

Some of those who won the smaller prizes owe their success to the novelty of their models. One of these was S. Whiteside, Clitheroe, who built a switchback railway. Unfortunately he appears to have attempted too much with the parts at his disposal, for although the model is carefully built it is rather spidery in appearance.



Neat workmanship and carefully modelled details are the prize-winning features of this fine petrol lorry, by J. Matthews, Coventry.



Efforts for the Radio Fund

Meccano clubs all over the world have set to work with a will to raise subscriptions for the "*M.M.*" Radio Fund for the R.A.F. The Plymouth M.C. led the way by organising a concert, at which by personal efforts they raised the handsome sum of £2 2s. This example was followed by clubs and Branches in Great Britain and Northern Ireland, in Eire and in far-away South Africa. The most gratifying features are the obvious eagerness of members and their pleasure in doing their share. For instance, in forwarding a subscription of £1 4s. 4d. from the newly formed Blundellsands M.C., the secretary tells me that the amount was collected for the Fund at an Exhibition recently held by the club and has exceeded his expectations. An equally heartening example comes from the Totnes M.C. There a collection at the club's Exhibition realised £3 2s. 0d., and a further sum of £2 was added as the result of a special sleight of hand display by Mr. Macnamara, Vice-President of the club.

I know from my correspondence that similar schemes are afoot in Branches and clubs that have not yet forwarded contributions. The latest German aggression and the outbreak of war on a large scale have increased interest in efforts to support our forces in every way, and if there are yet any clubs or Branches in which the subject has not been discussed I hope there will be no further delay. Everybody applauds the scheme; now is the time to translate approval into action. Clubs and Branches already make a good show in the subscription list, but I shall not be satisfied until every one is represented.

How to Make Visits Profitable

At this season of the year clubs and Branches usually arrange visits to works or places of railway interest. There is much more than mere enjoyment, or even interest, in visits of this kind, for they provide members with special opportunities for club or Branch work of a particularly attractive character. This was fully realised by the members of a club in Eire who spent an enjoyable afternoon looking round a beet-sugar factory. As a result they planned a series of models to illustrate the extraction of sugar from beet, and by joint efforts soon produced a splendid miniature sugar factory in Meccano. More recently the members of the Carmarthen Branch were shown round a large dairy. The consequence of this visit was a particularly attractive track meeting at which attention was concentrated on the running of "Milk Specials."

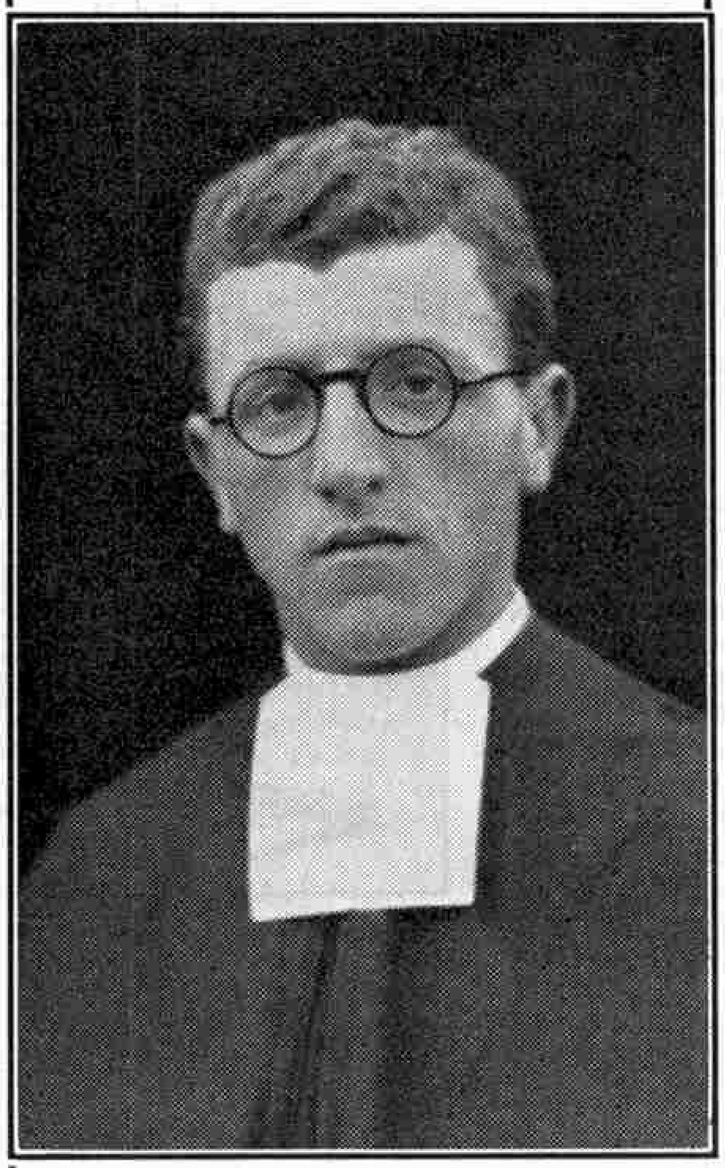
Practically every club or Branch visit or excursion should provide similar opportunities to these.

The Summer Programme

Now that the days are longer, clubs are pursuing the usual summer programme, of which cycling, rambling, photography in the countryside and other outdoor occupations form the greater part. Discretion should be exercised in selecting destinations and routes for cycle runs or rambles, so as to avoid crowded places as far as possible, and Leaders should bear in mind the need for air raid precautions. If photography is included among club pursuits the greatest care should be taken not to attempt exposures near points of military importance. What this means was made clear in the photographic article in the April "*M.M.*"

Meccano Club Leaders

No. 101
Rev. Brother Anthony, F.S.C.



Rev. Brother Anthony, F.S.C., is Leader of the Lasallian M.C., of which he was the founder. This Maltese club was affiliated in June 1939 and has since pursued a splendid programme of model-building. The skill and energy of members were reflected in the splendid display at the club's recent Exhibition which attracted more than 750 enthusiastic visitors.

Guild Members in the Forces

There are large numbers of past and present club members in every branch of our Forces. Many of them hold good positions, and I am very glad to know from reports from different quarters that the training that these members have received in club life, and the knowledge and skill that has come to them from their devotion to the Meccano hobby, have been of the greatest advantage to them. Every member will join with me in wishing the best of luck to all Guild representatives now serving and those who are to join up soon.

Club Leaders are keeping in touch by correspondence with their members who have been called upon for active service, and nothing delights club members more than a visit from one of their old associates when on leave. I too enjoy hearing from Guild members who are now in the Forces. I hope that many more will write to me, and look forward also to receiving news of many of them from their club Leaders.

Reading "*Club Notes*"

I often wonder how many officials and members read carefully through the reports that appear on the club notes page of each issue. Those who do will gather many very useful suggestions for improving their own programmes, and will realise that there are two sides to every report. One is that of the secretary who prepares it, and the other that of the reader. Both have to be satisfied, and the realisation of this should make it plain that a full and interesting report of all club proceedings is essential.

I have little to complain of in most cases, for secretaries take the task of preparing reports very seriously, and Leaders have often sent me summaries of recent events that they have themselves prepared when reviewing progress. There are clubs from which I get only sketchy notes, however. I should like the secretaries of these to think things over, when I am sure they will realise that they are not acting in the true spirit of the Guild, which calls for co-operative effort. I need only point out how the report of one club helps another to make this plain. Good reports then, not necessarily long, but full of detail, should be forwarded every month.

Proposed Clubs

Attempts are being made to establish Meccano clubs in the following places, and boys interested should communicate with the promoters, whose names and addresses are given below.

BROMLEY—B. Cogswell, 40, The Knoll, Hayes, Bromley, Kent.

PETERCULTER—J. M. Ogilvie, Beechwood, Peterculter, Aberdeenshire.

Blundellsands M.C.—Two successful meetings have been held. At one of these specialists gave talks on Meccano and Hornby Trains, including Hornby-Dublo, and answered questions from members. The second was a business meeting, at which a committee was elected. An Exhibition has been arranged, and the proceeds were devoted to the Meccano Radio Fund for the R.A.F. Meetings are now being held weekly. Club roll: 16. *Secretary:* J. K. Noel, 24, Lancaster Avenue, Crosby, Liverpool 23.

Queen Elizabeth's Grammar School (Barnet) M.C.—Model-building has again started in earnest. Models constructed have included a slave clock and an L.N.E.R. locomotive. Lectures have been well attended. Among them were one on the B.B.C., by a master of the school who has given radio talks, and a Lantern Lecture on the G.W.R. A film display illustrating transport methods, with special attention to the steam locomotive, also has been given. Club roll: 36. *Leader:* R. J. Beale, 99, Salisbury Road, Barnet, Herts.

Totnes M.C.—Membership of this newly affiliated club is increasing satisfactorily. Model-building competitions have been held regularly, in addition to Table Tennis, Darts and Stamp Collecting Contests. Points are awarded for club work and success in competitions. Several rambles and cycle runs have been enjoyed. A Magazine called *"The Bolt"* is to be published. Club roll: 20. *Secretary:* T. J. Macnamara, "Gables," Totnes, S. Devon.

Islandmagee M.C.—Membership is again increasing. An interesting feature of the programme has been a drawing contest. Games Evenings have been held and the Hornby-Dublo Electric Railway layout has been the scene of successful operations. Special meetings are being arranged for the summer. Club roll: 18. *Secretary:* S. McCready, "Hillmount," Islandmagee, Co. Antrim.

Praze School (Camborne) M.C.—Members have been active in model-building throughout the winter, and have enjoyed the opportunity that club life gives them of discussing Meccano affairs. Many useful models have been built, and games are now being organised. Club roll: 8. *Secretary:* D. James, Carnowall, Praze, Camborne.

Pennthorpe School M.C.—Owing to evacuation meetings could not be held during the winter, but satisfactory arrangements have now been completed and model-building and other activities have been carried on. A Model Engineering Exhibition is to be held, and preparations for this have kept the members very busy. Club roll: 24. *Secretary:* P. Kingsmill Brown, Pennthorpe School, The Mill House, Nr. Billinghurst, Sussex.

Schoolboy Model Club (Edinburgh) M.C.—All sections have been busy. Cinematograph shows are held weekly and club films have been taken. The Stamp Section has held interesting meetings, including a special centenary stamp exhibition during May. Wireless, Cricket and Golf Sections have been started, and an Ambulance Section has held successful meetings. The club celebrated its 12th Birthday by a special meeting, at which a photograph was taken. Club roll: 240. *Leader:* R. Croall, 19, South St. David Street, Edinburgh 2.

Our photograph this month illustrates a unique event in the history of the Exeter M.C. Two club teams, Elmside Rangers B and Tiverton Rangers, contested the final of the Hodder Cup, presented for competition among Junior teams in Exeter by Mr. M. C. Hodder, Leader of the club, who is seen on the right of this joint photograph of the two teams. The final was won by Elmside Rangers B, who are on the left of the group.

Tynecastle M.C.—Meetings are again in full swing. Members are enthusiastic in their preparations for the forthcoming Exhibition. Aeroplane models of many types are being constructed, and another particularly interesting exhibit will be a model battle cruiser. Members attended a Lecture on *"Modern Uses of Concrete."* Club roll: 20. *Secretary:* P. Copland, 52, Moat Street, Edinburgh.

Hornsea Evacuee M.C.—A talk on *"Electricity,"* by Mr. A. Tawn, was greatly appreciated by members. At other meetings members have practised simple electrical work, enjoyed film displays and carried out operations on the Hornby Railway. A special Lecture was given by Mr. R. W. Shooter, Leader, on *"Exploring the South Pole."* Cricket is now played. Club roll: 6. *Secretary:* F. Gladstone, 3, Alexandra Road, Hornsea.

Acton M.C.—Interesting large models constructed have included a railway coach and a Scotch derrick, which gave great fun when it was put into operation. Track meetings also have been held. At one of these an electric Gauge 0 layout was used, and at others a Hornby-Dublo layout was built up from material contributed by two members. Both electric and clockwork trains were run. A Film Show, a Darts Tournament and Lectures have provided variety. Club roll: 15. *Secretary:* S. W. Simmons, 7, Alfred Road, Acton, London W.3.

MALTA

Lasallian M.C.—In a special Model-building Contest models had to be constructed from 20 Meccano Parts, and prizes were awarded for the best three entries. At every meeting time is given for private reading from the club's Library. A talk on *"My Visit to Meccanoland"* was given by Mr. J. M. Demanuele, who has visited the factory at Liverpool. Club roll: 31. *Secretary:* A. Caruana, "Floria House," Victory Street, Gzira, Malta.

NEW ZEALAND

Christchurch M.C.—A very successful year has just been completed. Meccano and Hornby Train Nights, Talks, Games, Debates and Competitions have made up an excellent programme. The subjects of the Talks have been *"Air Raid Precautions,"* by Mr. E. R. Moyle, R.M.S. *"Queen Mary,"* by Mr. T. Coates, and *"A Tour of Europe,"* by Mrs. Corday. An outstanding event was the 10th Birthday Social, when excellent models were on view and a Hornby Train layout was operated. Prizes were presented in both Meccano and Hornby Train sections. Visits have been paid to railway workshops, a printing works and a flour mill. Joint meetings have been arranged with the Ashburton M.C., the members of which this year won the Inter-club Shield. Club roll: 26. *Secretary:* D. Pratt, 102, Kerrs Road, Christchurch N.E.1.

SOUTH AFRICA

Pioneer (Pietermaritzburg) M.C.—Model-building shows satisfactory improvement. Special efforts were made for the club's Exhibition. An Air-Rifle Section has been formed, and monthly shooting contests are being arranged. The Savings Bank continues to be a special feature, and through it more than £200 has now been saved by members. Club roll: 8. *Secretary:* W. D. Everton, 491, Longmarket Street, Pietermaritzburg, Natal, South Africa.

QUEEN of the BELGIANS & TRIANGLE PACKET FREE

Philately is the finest indoor hobby these black-out nights. Start collecting stamps to-day and send immediately for this wonderful free offer of 30 different stamps, which include: Malta, Jugo-Slavia (portrait of the King assassinated in France), Iran (Shah), Czecho-Slovakia, Map stamp, Italy (King Emmanuel), Australia (Queen), White Russia (where General Ironside fought), old Canadian, U.S.A., Eire (sword), Germany (bomber), interesting New South Wales. Finally a fine Hungarian, Belgium (Queen Astrid, one of the most beautiful stamps ever issued), and a large triangular stamp. All free. Just send 2½d. postage, requesting approvals.

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Fine packet of unused African stamps from Belgian Congo (river scene), Morocco Agencies King George VI, already obsolete, Italian East Africa (Abyssinia, etc.), Sudan, Somali Coast, Algeria, Cameroons, a fine set of 5 Ivory Coast, new issue, inscribed in error 'Baloue Woman' for 'Baoule Woman'—one is already obsolete—and another set, only just issued, of French Guinea, Mozambique, etc., etc., 30 stamps in all, sent free to all genuine applicants for approvals enclosing 2½d. postage. Only one gift to each applicant.

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H. C. WATKINS (M.M. Dept.), Stamp Importer, **GRANVILLE RD., BARNET**

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Set of 3 S.G. Nos. 214/216 for 7d. post free.

MALAY STATES

Collection 100 different. A most interesting and representative lot, bargain 2/6. Only 4 lots at this price,

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20	,,	8d.	
25	,,	10d.	
5	Lithuania	2d.	
10	,,	5d.	
5	Bulgaria	2d.	
10	,,	4d.	
15	,,	6d.	
20	,,	8d.	
25	,,	10d.	
30	,,	1/-	
5	Bosnia	2d.	
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10	Russia	2d.	

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ONE THOUSAND STAMPS ON APPROVAL

From which you may select any 100 for 3/6. This selection is not made up of the very commonest varieties, but contains stamps catalogued at 1/- each or more. (I do not sell less than 100.) A returnable deposit of £1 is required from overseas applicants.

During this month I will include a stamp catalogued at least 3/-. Can you find it?

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For other stamp advertisements see page ix

STAMP COLLECTING

WAR VESSELS ON STAMPS

IT is natural that the stamp designs making the greatest appeal to collectors at the present time are those that have a war interest. In this and succeeding articles we propose to show our readers that it is possible to form fascinating collections of stamps illustrating war subjects.

We begin with warfare at sea, and indeed this side of our story is by far the most completely illustrated. It is possible to trace on stamps the development from the galleys of the early Mediterranean nations down to modern battleships. The only missing feature is the most modern development of all, the aircraft carrier.

The 1f. value of a series issued by Tunis in 1926 gives an excellent start. It shows a Carthaginian fighting galley. The long ships of the Norsemen, who ranged the oceans as far south as the North African coasts and west to the Americas, are best illustrated on the 5c. stamp of the U.S.A. Norse Centennial issue of 1925. The Viking practice of fitting the warriors' shields along the bulwarks to form a breastwork is very well shown in this stamp.

The transition to modern days is by way of the frigates of Nelson's days. There are unfortunately no really representative designs showing intervening developments, although we might fairly take such vessels as Columbus's *"Santa Maria,"* from Spain's Columbus commemorative issue of 1930, or Vasco da Gama's *"San Gabriel,"* from Portugal's 1898 issue, as being typical of warvessels of the 15th and 16th centuries.

There are several illustrations of ships of Nelson's day, the best being of the grand old *"Victory"* herself, on Antigua's Tercentenary issue of 1932. Nelson called at English Harbour, Antigua, to refit during the memorable chase across the Atlantic and back that was the prelude to his great victory at Trafalgar.

A naval battle is shown on the Greek 4 dr. issue of 1927. This commemorates the centenary of the Battle of Navarino Bay, in which the combined fleets of Britain, France and Russia engaged the Turkish fleet. The ship shown on this stamp, which is illustrated on this page, is probably the frigate *"Dartmouth."* The commander of this ship found that his vessel was lying with a Turkish fireship on his windward side, and to lessen the danger to his vessel he sent a boat's crew to demand the removal of the Turkish ship to a safer place. His action was taken as a declaration of war, and the tremendous battle that followed ended with the complete destruction of the Turkish fleet.

Greece also gives us two excellent illustrations of the modern cruiser type, both designs showing the cruiser *"Georgios Averoff,"* named after the Greek millionaire who presented the ship to his country. One of these stamps is the 50 dr. value of the 1933 issue, in which the view of the ship is accompanied by a portrait of Admiral Kondouriotis, Commander in Chief of the Greek Navy of that time. The ship had previously been shown on the 3 dr. value of the 1927 issue, illustrated here.

The most modern ship in our collection is the French battleship *"Clemenceau,"* illustrated here on the 90c. stamp issued on 17th January of last year to commemorate the launching of the ship. The accompanying portrait is that of the French statesman M. Clemenceau, Premier of France during the later days of the Great War of 1914–18, after whom the ship is named.

Italy also has featured a modern battleship, *"The Trento,"* which was the subject for the design of the 1L.25 stamp in the Leghorn Naval Academy commemorative issue of 1931. The 20c. value of the same set showed the old training frigate *"Amerigo Vespucci,"* now used to give Italian naval cadets experience of sailing craft, without which, old-timers say, they cannot justly claim to be seamen.

A rather earlier type of battleship is shown on the September 1921 issue of Japan. This issue commemorated the safe return of the Crown Prince of Japan from a world tour on which he had been escorted by the battleships *"Katori"* and *"Kashima,"* both of which are shown in the 1½ sen stamp illustrated here. These sister ships, each of 16,000 tons displacement, were completed in 1906.

Our story would be lacking if it did not include reference to under-water craft. Fortunately there is an excellent illustration of a modern submarine on Roumania's 1L. stamp of October, 1936, issued to commemorate a Marine Exhibition at Bucarest. This stamp shows the submarine *"Delfinul,"* which is 225 ft. in length and has a surface speed of 14.9 knots.

American countries provide many good designs for our collection. The best of all is the Philippine Islands 2 p. of 1935. It bears a representation of the Battle of Manila Bay, fought between the United States and Spanish fleets on 1st May 1898, in the struggle for possession of the Philippine Islands. The stamp shows the battle line of the American fleet and part of the Spanish fleet in flames.

The Uruguayan cruiser *"Montevideo,"* illustrated on the 1c. value of Uruguay's independence issue of 1908, is of special interest, for this vessel, and two small gunboats also shown in the design, comprised the total strength of the Uruguayan Navy of the day. Other South American representatives are the Paraguayan gunboat *"Paraguay"* and *"Humaita,"* shown on the 1p. stamp of the 1931 Air issue and the 1.50p. of the general issue of 1931 respectively, and the Colombian 1,200-ton light cruiser *"Cartagena,"* seen on the 5c. value of the 1903 issue.

A happy accompaniment to a collection such as this would be one showing naval bases and harbours. There are several stamps that spring to mind immediately in this connection. For example, there is the 1d. of Gibraltar's current issue, which shows a splendid view of the great rock, with a British destroyer and a naval drifter.

New Collectors' Corner

Removing Paper from Stamps

One of the problems that bother new collectors is how to remove paper from the backs of stamps that have been given to them by friends. Some of them try to peel the paper by hand. Others resort to steaming, or to soaking the stamps in a bath of hot water, and then find that the colour on some of the stamps has "run."

Now it is really very simple to remove paper. Before we explain how it is done, however, we want to make it clear that it is not always advisable to remove the paper. Many stamps are worth much more when left on their envelopes. New collectors therefore should make it a rule not to take stamps off complete covers until they have made sure that it is not worth while to keep these intact. If the envelope is not complete, but the whole of the postmark is visible on the piece of paper, the rule should be to trim the paper into a neat rectangle showing the postmark intact, and to mount that in the collection intact. Later on that postmark may give an enhanced value to the stamp.

When only odd bits of paper are present, they must be removed, and in only a few cases can this be done readily by hand. It depends on the gum used with the stamp. Certain gums, such as those used on Canadian and United States stamps, permit easy peeling. Most others do not, unfortunately, and the treatment for stamps on which they have been used is to float them face upward on the surface of a dish of *cold* water until the moisture has penetrated the backing paper, which will then slide off quite readily.

This is a fairly long process and we find it convenient to leave the stamps floating overnight. There is little risk of the water penetrating right through the stamps and affecting the ink in that time. Care must be taken to see that the stamps are floating, and that water has not splashed on to the faces of any of them.

Stamp Gossip

and Notes on New Issues

The Centenary Stamps

The most important of the month's new issues is Great Britain's series to commemorate the stamp centenary, and we imagine that every one of our readers has acquired for himself a complete set of the six values from ½d. to 3d. that appeared on 6th May.

The design, as our illustration of the 1½d. value shows, is a very simple combination of the famous "Penny Black" design, showing the head of Queen Victoria, and that used for the current stamps of Great Britain, showing the portrait of King George VI. The centennial dates 1840 and 1940 appear in the bottom corners, with the figure of value between, and the names of the two monarchs appear above their portraits, flanking a crown. Britain has remained true to tradition by omitting to give an indication of the country of origin on the stamp. Each of the stamps is printed in one colour, corresponding to the colours of the normal issues.

Some lucky readers will have received first day covers posted at the London Centenary Exhibition and bearing the special commemorative postmark. On these the new stamps are carried on the special envelope issued by the Royal Philatelic Society in aid of Red Cross and St. John Funds. Overseas readers are reminded that the competition in which such covers were offered as prizes, announced in the May "*M.M.*," is still open, but entries must arrive not later than 31st August.

* * *

We illustrate this month the 8d. value of the New Zealand Centennial Commemorative issue. This was issued to replace the 7d. value in the same design, which has become unnecessary owing to changes in the postal rates. An illustrated article on the Centennial issue appeared in the "*M.M.*" for October of last year.

Salvador Goes Astray

It was perhaps to be expected that other countries should join Great Britain in issuing stamps commemorating the centenary of the adhesive postage stamp, but one cannot help feeling that it would have been nicer had Salvador held back its issue until the centenary date. The stamps ascribe to Sir Rowland Hill a claim to be the inventor of the adhesive stamp, as our illustration of the 8c. value of this issue shows. Two air mail stamps, 30c. and 80c. values, in the same design were also issued.

As our readers know, Sir Rowland Hill was Postmaster-General in 1840, and his claim to fame is that he was far-sighted enough to see the important possibilities of the adhesive stamp as an easy means of collecting postal charges. It is generally recognised to-day that the credit for the idea of the stamp itself must be given to James Chalmers, the Dundee bookseller who conceived the idea some three or four years before its adoption.

A Chilean Jubilee

A rather belated commemoration of the jubilee of Chile's sovereignty over Easter Island in the Pacific is marked by the issue of two stamps. The lower value, which is illustrated on this page. shows a portrait of Policarpo Toro Hortado, commander of the steamship "*Abtao*," also seen in the design, who concluded the original treaty with the natives of the Island. The higher value, 3$60–6$40, is almost identical, the difference being the inclusion of a portrait of Brother Eugenio Eyraud, a Franciscan monk who lived on Easter Island from 1864 until 1866.

* * * *

The newest issue from France depicts the possessions of the French Empire. In the design, which is reproduced in one of the illustrations on this page, the French Colonies are marked in black on the plain outline of the map.

A Turkish Pro Juventute Issue

Child Welfare charity stamps are among the most popular with collectors all over the World, and gradually the number of countries making regular issues of such stamps is increasing.

Turkey is the latest addition to their ranks and we illustrate one of the two values that have recently appeared. This shows a nurse and child. The 1k. value shows a laughing child. The Turkish Child Welfare emblem, the national crescent on a red star, appears on both stamps.

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

HORNBY RAILWAY COMPANY COMPETITION PAGE

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

READ THIS FIRST

This month we again include two main contests, one for the Senior Section members of the H.R.C. and the other for Junior Section members. The Senior Contest is open to all those members who are 12 years of age and over, and the Junior Contest to all members under 12 years. On no account must members of the Senior Section enter the Junior Section Contest or vice versa.

ROUTE FINDING CONTEST (SENIOR SECTION)

For the Senior members this month we have an interesting Route Finding Contest. The panel on this page contains a list of 12 stations situated in various parts of the country. The problem we set competitors is to find the most suitable route for an intending passenger travelling from London to each of the places named. Each competitor is required to describe in his entry the most convenient route, stating the lines travelled over, the stations at which a change may have to be made, and any notable railway features along the route selected.

By railway features we mean tunnels, bridges, viaducts, cuttings, etc., that are actually on the line. Locomotive sheds that are passed should also be included in the list, together with their district letter or number if any. Features of interest visible from the carriage, but not actually on the line, must be ignored. Valuable points will be scored by competitors who include in their entry, details of such matters as jointly owned lines that may be traversed on any of the routes.

We are sure that Senior members will thoroughly enjoy planning out the routes called for. The competition will be divided into two sections, Home and Overseas, in each of which prizes to the value of 15/–, 10/6 and 5/– respectively will be awarded to the three competitors who submit the best lists. In addition several consolation prizes also will be awarded.

Envelopes containing entries must be marked *"H.R.C. Route Finding Contest," Senior Section*, and should be posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 29th June. The closing date for Overseas members is 30th September.

Each entry must bear the competitor's name, full postal address, age and H.R.C. membership number. It should be clearly understood that this Contest is only open to members of 12 years of age and over.

GILDERSOME
YOKER
CHWILOG
BRAUNTON
ABBEY TOWN
UPWEY
SOUTHWELL
HOW MILL
ILKLEY
CORPACH
STRATFORD-ON-AVON
IRTON ROAD

H.R.C. COMPETITION RESULTS

HOME

March "Errors Contest" (Senior Section).—First: H. Oliver (50919), Romford, Essex. Second: J. McCann (63815), Wallasey, Cheshire. Third: E. Laurie (69852), Port Glasgow, Renfrewshire. Consolation Prizes: J. M. Borwick (61689), Cockermouth, Cumberland; L. Crosland (48251), Huddersfield, Yorkshire; F. Hastings (65824), Sheffield 2; D. L. Fytche (69275), Crewe; L. Humphreys (69905), Isleworth, Middlesex.

March "Errors Contest" (Junior Section).—First: P. Hocking (45335), Portsmouth, Hants. Second: M. Loat (70011), Havant, Hampshire. Third: G. R. Selby (68722), Wolverhampton. Consolation Prizes: J. Warren (66174), London S.W.14; G. Salmons (61834), Birmingham 20; R. W. Vivian-Neal (68379), Sunningdale, Berks.; P. J. Radford (66981), Bath, Somerset; J. H. Bishop (61104), Thornton Heath, Surrey; J. A. Field (68743), Oxted, Surrey.

March "Drawing Contest No. 2."—First: L. C. Tutton (69909), Pontypridd, Glam. Second: E. Oldham (43390), Hyde, Cheshire. Third: J. Laing (55374), Dunstable, Beds. Consolation Prizes: D. Mc G. Clarke (54128), Liverpool 15; D. Smith (70045), Burton-on-Trent, Staffordshire; B. Coney (68403), Grimsby, Lincs.; P. J. Waters (34193), Birmingham 28; A. J. Reed (68286), Aylesbury, Bucks.

OVERSEAS

December "Christmas Names Contest."—First: Miss V. Galea (69793), Valletta, Malta. Second: D. Murison (37642), Buenos Aires, South America. Third: F. J. Harrison (65068), S. Rhodesia, S. Africa. Consolation Prize: J. G. Gnanadurai (1964), Trichinopoly, India.

December "Jokes Contest."—First: M. P. Cozens (52564), Victoria, Australia. Second: T. A. Wade (63755), Johannesburg, South Africa. Third: K. E. Lang (52901), Featherston, New Zealand. Consolation Prizes: P. F. Smith (54173), Australia; F. J. Harrison (65068), S. Rhodesia, S. Africa; R. P. Myburgh (37538), Cape Province, S. Africa; K. Alexander (64852), Transvaal, South Africa.

JUMBLED SENTENCES (JUNIOR SECTION)

In July last year we announced a "Jumbled Sentences Contest" for Junior members. This proved both amusing and interesting, and therefore we offer another of these contests this month. A short railway story has been re-arranged by altering the positions of certain words, phrases and sentences. The result is obviously nonsense, and competitors are required to restore the original so as to make a correct and sensible story. In doing this they may change punctuation marks but no words are to be added or left out.

The following is the re-arranged story: "As time drew near, the driver watched for his destination reading matter. Steam was running down the sleek corridor of the coaches, and metals made their way to the shed. The journey scene was as usual, passengers and fireman carefully stepping over the engine purchased, and once the driver had boarded the slight incline to their station, the 'all clear' regulator opened, and she took her seats while the distant train slowly standing outside, was to be already up. They soon coupled people leaning out talking and receiving sweets for the others. Then the long signal moved out to its train of windows."

To the senders of the three best entries received in each section, Home and Overseas, will be awarded prizes consisting of any Meccano products to the value of 15/–, 10/6 and 5/– respectively. On the back of each entry submitted must be clearly written the sender's name, full postal address, age and H.R.C. membership number. This Contest is only open to Juniors, that is all members under 12 years of age.

Envelopes containing entries should be marked *"H.R.C. Jumbled Sentences (Junior Section)"* and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, not later than 29th June. The Overseas closing date is 30th September.

COLDEAN (BRIGHTON).—Successful track meetings have been held. One of these was devoted to an electric train demonstration. A Talk has been given on "*Signalling*," and the relative merits of steam and electric trains have been debated. An outing to the Brighton Locomotive Sheds of the S.R. has been arranged. Secretary: H. W. S. Bellchambers, 20, Coldean Lane, Parkside, Brighton 6.

BLACKPOOL.—The outdoor track has been overhauled, and relaid in places where the severe weather of January caused damage. A drawbridge has been constructed to carry the track over a garden path. Branch visits have been paid to the layouts of individual members, to whom hints and suggestions for improvements were given. Secretary: J. Irvine, 8, Dudley Avenue, Blackpool.

LOUGHTON.—The Rolling Stock Manager has overhauled all Branch material. Surplus stock was presented to the boys of a school in which a new Branch has been formed. A party of Scouts visited the Branch room and took part in operations. The visitors all wished to stay longer than could be allowed! A visit has been paid to the electric railway of one of the members, and the operations proved of intense interest. Secretary: G. W. Ruffell, 1, Elmhurst Way, Loughton, Essex.

NORTHAMPTON.—The 5th Birthday of the Branch was celebrated by a splendid Concert, at which all the items were contributed by members. Track running has been continued, various timetables being operated. At one meeting a realistic "crash" was staged, after which only a single line was available for operations. The purpose of the scheme was to test the initiative of members in charge of various sections of the layout, and the work proved very instructive. The Branch "*News Letter*" contains interesting news of club proceedings in addition to general news and articles of interest. Secretary: D. J. Rushton, 40, The Vale, Northampton.

DUMPTON HOUSE (BROADSTAIRS).—Meetings of this fine school Branch have been continued in spite of difficulties due to the evacuation to distant quarters and illness of members. Various layouts are now being tried out, and interest in operations is increasing. Secretary: J. P. Oboussier, 111, Victoria Drive, London S.W.19.

UPPER WHARFEDALE.—The track has been relaid and a new goods station constructed. The extension has necessitated several interesting alterations, and operations have been made more realistic. Cycle runs, walks and picnics have been arranged for the outdoor season. Secretary: D. H. Scales, 1, The Avenue, Grassington, Yorks.

ISLANDMAGEE.—The Branch layout is continuously being extended and improved, and additional rolling stock obtained. By the kindness of Mr. J. Hunter, President, new electric wiring has been installed for lighting purposes and for power supply to the track. The layout can be varied in order to allow operations of various kinds to be carried out, and members are becoming expert in running mainline trains, shunting and other railway movements. Secretary: S. McCready, "Hillmount," Islandmagee, Co. Antrim.

FOLKESTONE.—New equipment constructed and brought into use includes locomotive sheds, platelayer's hut and a suburban railway station. A terminal station is now being built. Wartime traffic is run on the layout. New timetables were prepared for this, and the number of goods trains has been increased. Preparations are being made for a demonstration of railway working in the Branch room. Secretary: W. F. Cotter, 68, Linden Crescent, Folkestone.

CARMARTHEN.—A recent track meeting was devoted to competitions in train control and in switchboard operation. At other meetings normal track operations were carried out. Other interesting events have included a General Knowledge Bee, Film Shows and a visit to a large dairy. One result of the visit was the running of realistic "Milk Specials" at a subsequent track meeting. Secretary: J. D. Lewis, 7, Spilman Street, Carmarthen.

HORNSEA.—All sections have held track meetings, at which various types of layouts designed by Mr. R. W. Shooter, Chairman, were brought into use. Demonstrations of shunting increased the efficiency of junior members in this operation. Passenger train operation also has been carried out regularly. Secretary: D. E. Parker, Oak Dene, Burton Road, Hornsea.

BEDFORD SCHOOL.—The track has been overhauled and the result has been seen in more efficient timetable running. A new section of the layout is to be doubled, and a bridge has been designed for one of the stations, the approaches to which have been relaid. Work on track and on scenery is continuous, so that the layout always offers new points of interest. Film shows also have been arranged. Secretary: F. E. B. Webb, 59, Rosamond Road, Bedford.

Proposed Branches

The following new Branches of the Hornby Railway Company are at present in process of formation, and any boys who are interested should communicate with the promoters, whose names and addresses are given below.

ALDERSHOT—P. Henham, 103, Holly Road, Aldershot, Hants.

BROMLEY—J. Pooley, 15, Pickhurst Lane, Hayes, Bromley.

BROMLEY—T. Abel, 8, Broadoaks Way, Bromley, Kent.

CEYLON—Mr. S. L. Abeysingha, "Simpson Villa," Udahamulla, Nugegoda, Colombo, Ceylon.

GUERNSEY—R. Blicq, Wendy Cotte, La Bellieuse, St. Martin's, Guernsey, C.I.

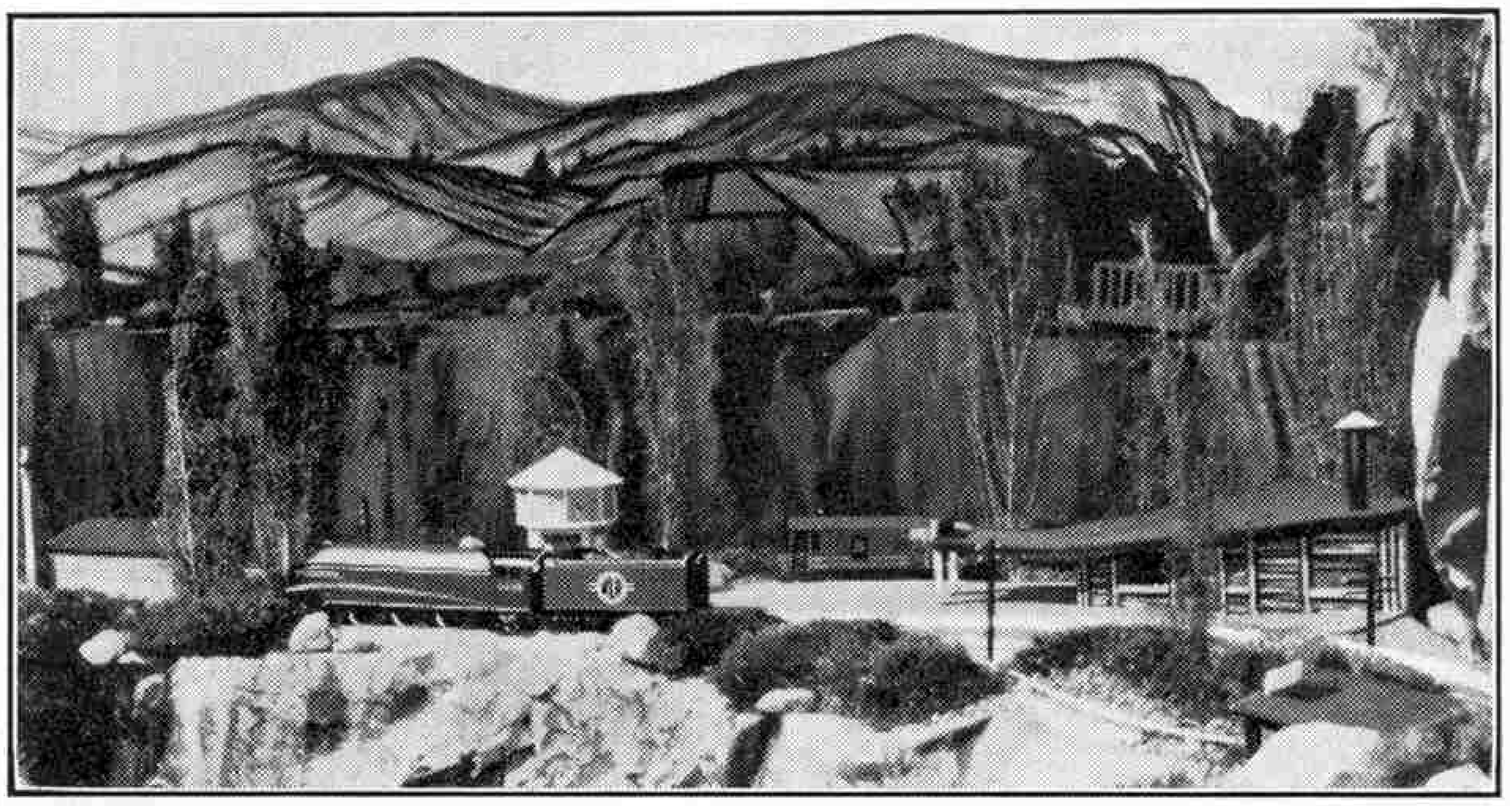
HAYWARDS HEATH—J. Godsmark, Colwood Hill, Warninglid, Haywards Heath.

TADWORTH—J. Clew, Dunrovin, 39, Kingswood Road, Tadworth.

A group photograph of members of the St. Peter's School, Southbourne, Branch No. 382. Chairman, Rev. Francis Head, S.J., Secretary, V. H. G. Wykes. This fine school Branch was incorporated in November 1939. Track operations on both Hornby and Hornby-Dublo layouts are carried out at meetings, which also include games and end with a tea party.

The "Western Lines Railway"

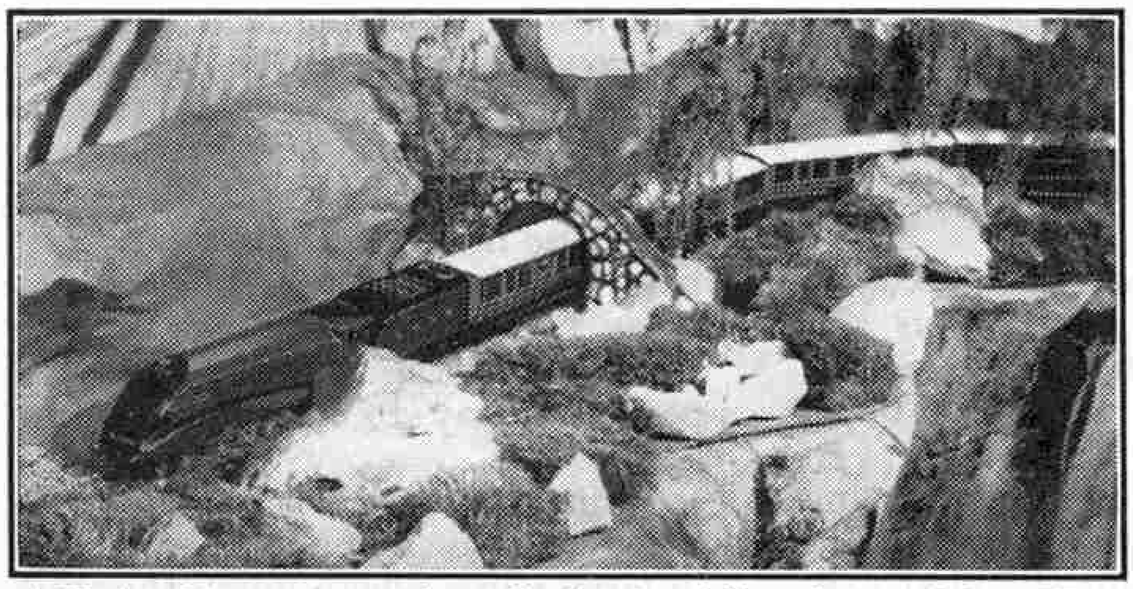
A Scenic Hornby-Dublo System



A general view showing some of the scenic effects. The log-cabin station in the foreground is "Rigby"; in the distance are "Mossbank Level" and "Red Bridge."

THE illustrations reproduced on this page show parts of the "Western Lines Railway," a freelance system jointly owned by Mr. Walkden Fisher, of Southport, and two friends. These enthusiasts employ Hornby-Dublo locomotives, rolling stock, track and signals, but the stations, bridges and scenic effects have been produced entirely by themselves. The railway is electrically operated, and although it is simple at present as far as the actual track plan is concerned, schemes are prepared for elaboration and extensions.

The layout is arranged on a raised baseboard supported on trestles and for the most part it follows the walls of the cellar. The central space left is extensive, for the area available for the railway is approximately 17 ft. 6 in. by 15 ft., and in this space there is to be a terminal extension.



A Western Lines express passing under the stone bridge after negotiating "Woody Bend." The photographs reproduced on this page are by Herbert Derbyshire.

The principal station is named "Harwillden," this title being compounded from the names of the three proprietors of the railway. Trains leaving this station are described officially as "Eastbound" or "Westbound" according to their direction. Westbound trains curve out of the station and then have a considerable length of straight track to cover. "Mossbank" tunnel is a short tunnel encountered on this stretch; then follows a stone hump-backed overbridge, and the next curve is known as "Woody Bend." Here the entrance to the cellar and the need for providing convenient access to the railway have involved the erection of a span known as "Red Bridge" which, according to the company's map, crosses "Sandy River."

Two routes are available through the Mountain Section that soon follows. One plunges boldly through the mountains of gloomy "Devil's Defile," "Snake Bend" and "Greycliff Tunnel." The other route branches off and serves "Rigby," a log-cabin station built in the true Western style, and then crosses "Shadow Canyon," as the sheer drop between the projecting part of the baseboard supporting the "Rigby" branch and the main baseboard is called.

"Shadow Canyon" Bridge is perhaps the most notable engineering feature on the line. This structure was actually built on the site, using balsa wood, a material familiar to all model aircraft constructors, and white pine. No glue was employed, and the various members were pinned together with fine pins. Finally the whole structure was braced with fine strong cord. The two routes, one via "Snake Bend" and the other via the bridge, converge again and unite immediately before "Rought." From the "Rigby" side of the bridge, however, a curving line known as "Big Bend" connects the two routes intermediately, "Big Bend" actually forming one side of a triangular layout. "Rigby" station lies between "Big Bend" and the branch section of this triangle, the station being served by both tracks.

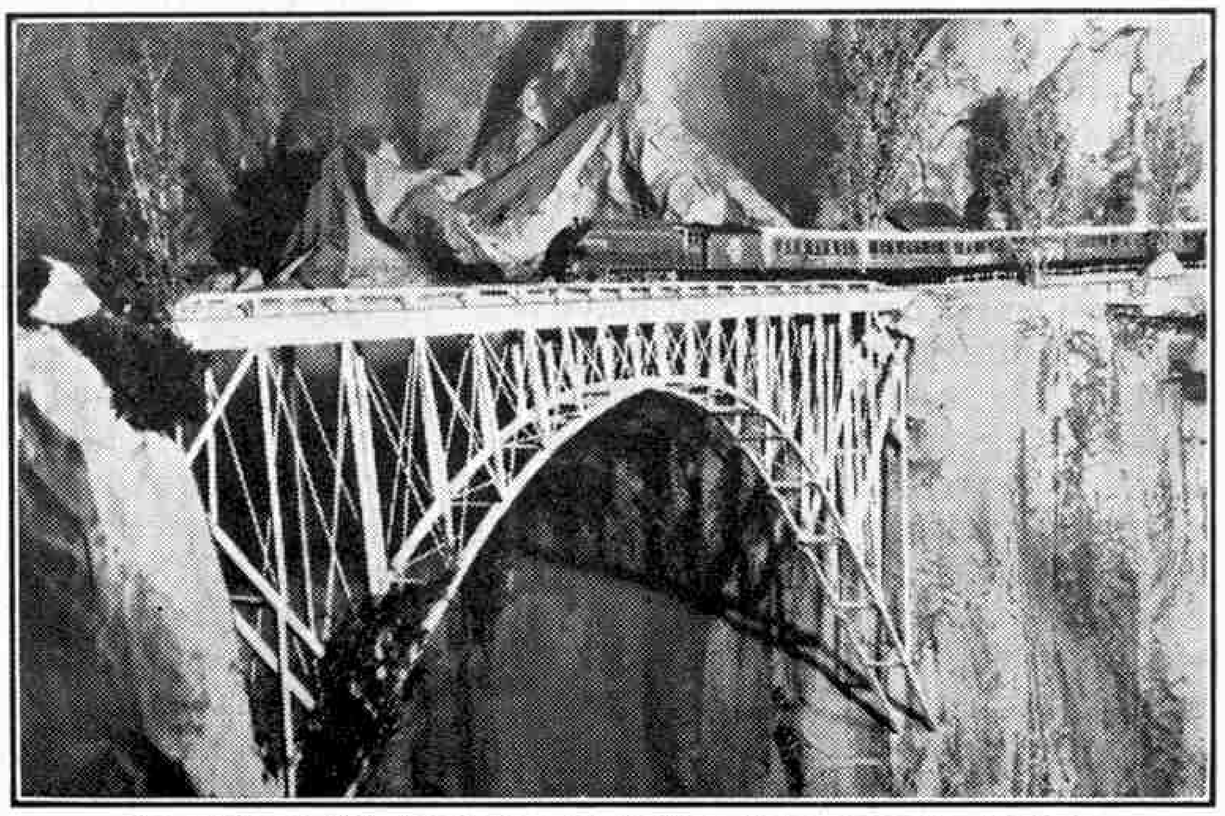
After "Rought" comes the "Lowbank" section, then "Little Bend" and, with the control panel on one side and the site for engine sheds and sidings on the other, the line again reaches "Harwillden" where we started our brief "tour."

The system has a definite and original character, as befits a freelance railway. The scenic effects are notable and the methods of obtaining them are full of interest. Good use is made of the usual type of scenic background, but in the neighbourhood of the line itself actual rocks, moss and trees are reproduced in miniature. In order to explain exactly the methods used it is best to use Mr. Fisher's own words:

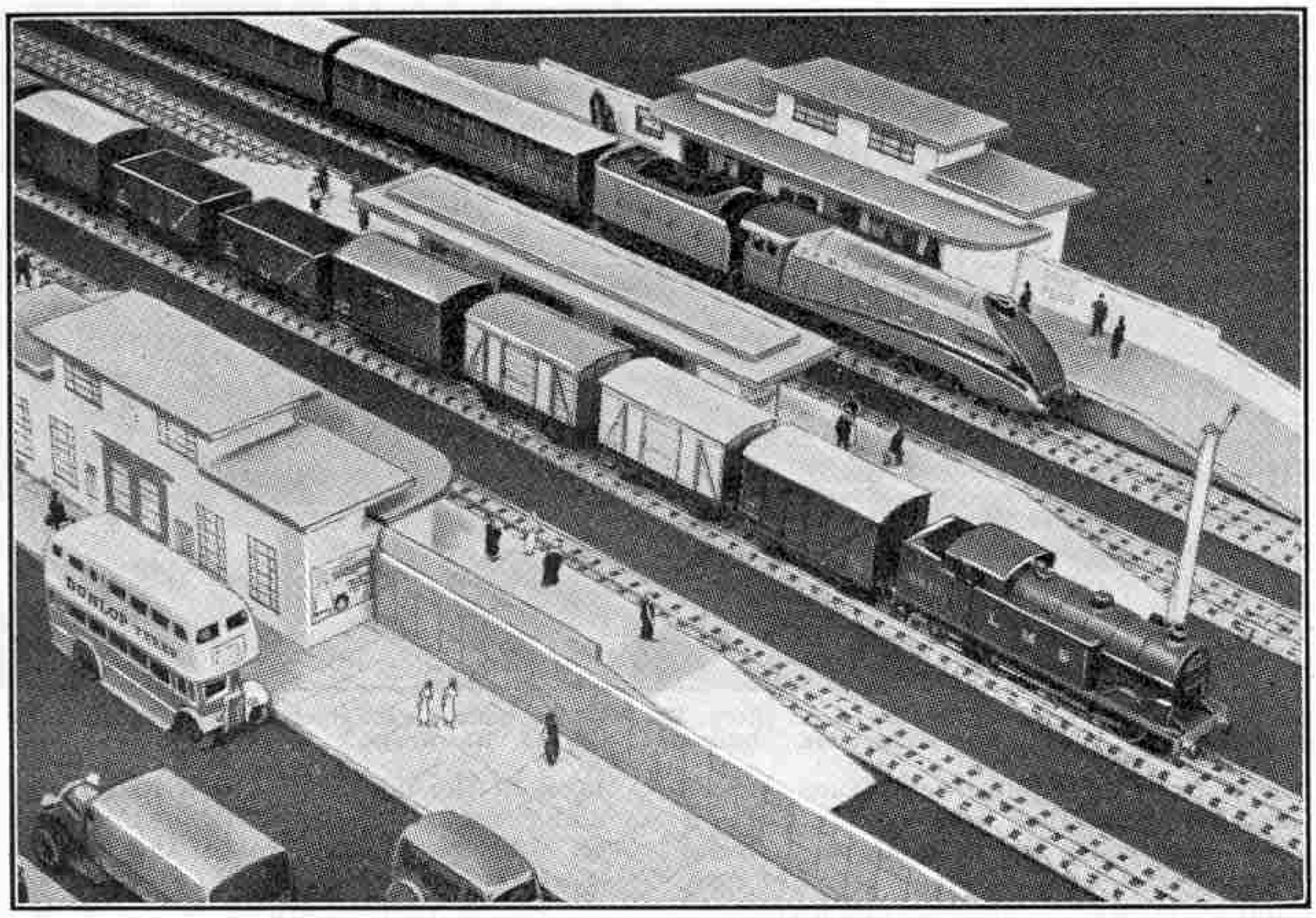
"To obtain the required rock-like effect of cliff and canyon, large sheets of brown wrapping paper were first crumpled into balls. After being glued along the edge of the baseboard and on to the floor itself they were allowed to dry. Then a grey matt water paint was brushed on in rough vertical strokes followed by black and brown water paint. Luckily I am in possession of a spray "gun" and used this to gain the final effects by spraying the surfaces with blue and green here and there."

At selected points along the lineside actual moss has been used in conjunction with carefully chosen pieces of rock. The moss keeps its natural colour for some months. The reproduction of trees presented a serious problem. After many experiments in their manufacture the scheme that was found successful was to use some Kochia bushes that had been rooted out of a garden last autumn. These of course were brown and dead, but retained their feathery, leaf-like foliage. They were "revived" by spraying with green water paint. Portions of varying lengths were stripped from them to form the woods and coppices bordering the line.

The background scenes were simply drawn and coloured on plain shelf paper.



The eastbound "Shadow Canyon Limited" on "Shadow Canyon Bridge."



An interesting station served by separate pairs of tracks in each direction for fast and slow traffic. This is a variation of the loop line arrangement referred to in this article.

Fun with a Hornby-Dublo Railway

Sidings, Yards and Station Schemes

THE first addition the owner of a Hornby-Dublo railway makes to the plain track with which he begins is usually a siding in which to accommodate his train when it is not actually in use. The simplest form of siding is the ordinary dead-end track that is led off from the main line by means of points and is terminated by means of Buffer Stops. This is satisfactory as long as the railway remains relatively simple with no particularly complicated operating schemes.

A frequent development of the dead-end siding is the loop line, as we have frequently pointed out in previous articles. The loop is more useful actually than the plain siding because trains can enter and leave it in either direction without having to reverse. In model railway practice this avoids a good many irksome backing movements and makes for smarter working. For purposes of rolling stock storage however the dead-end has its uses, and several sidings of this kind together may be said to form a "yard." The familiar goods yard that is provided at most stations is usually a combination of one or more loop lines and as a rule several dead-end sidings.

The local goods yard serves several purposes. Wagons loaded with traffic for the station concerned are accommodated in the various sidings, and so also are empty vehicles that are required for loads being despatched from that point. In addition, the wagons of a stopping goods train can be re-marshalled there in readiness for the next call. Coal, mineral and any bulky or special traffic is usually handled in the open, but ordinary merchandise and particularly perishable traffic is dealt with at a goods station. This consists particularly of a "bank" or raised platform where the loads are dealt with. The platform may be partly or entirely covered by a warehouse type of building that includes an office and so on.

Goods stations naturally vary in layout and in detail, but a useful type is represented by the Hornby-Dublo Goods. This has its warehouse building actually on the platform, and the projecting roof covers a good deal of platform area outside the building. It represents the modern style of concrete construction and has a clean and effective appearance. Two of the illustrations to this article include a Goods Station as one of their features, and the general characteristics of it can be seen very well.

The position of the goods depot in the miniature yard will as a rule depend on the nature and extent of the space available. Whenever possible it should be placed away from the main line so that road vehicles can easily reach the platform. Then, too, the various sidings come between the main line and the track serving the goods platform, and any shunting that may be carried out on them will not interfere with the working of the depot. The lower illustration on the opposite page shows an attractive arrangement for the Goods Depot and part of the yard. The Depot is placed at the extreme edge of the "railway property" and so is easily reached by road motors such as the Dinky Toys vehicles shown alongside it. It is so placed that movements of engines and wagons in the yard do not disturb wagons and vans that are being attended to at the "bank," as railwaymen often call the platform of a goods station.

An interesting feature is the short dead-end track or shunting spur that lies between the main line and the goods depot track. This makes it unnecessary for an engine that is moving to and fro shunting in the yard sidings to draw out on to the main line in order to clear the yard points with its "train" of two or three wagons. Instead, the engine moves down the shunting spur and possible delay to main line traffic is avoided.

Shunting spurs should be provided whenever possible, especially in large yards where much shunting and marshalling is done. Marshalling yards differ from the ordinary local goods yard in that they provide centres from which wagons arriving in trains from various areas can be forwarded to their destination. The layout of a marshalling yard in miniature, as in actual practice, will depend on space and "local conditions." As a rule however the sorting sidings consist of a series of loop lines running parallel to one another.

Trains arriving for re-marshalling are accommodated in what are known as reception roads, these being normally long loop lines connected to the main line. The advantage of having reception roads is that main line traffic is not affected if the goods trains have to wait before they can be dealt with in the yard. In such yards, too, as shunting movements go on continuously, it is specially important to provide shunting spurs so that all movements are kept clear not only of the main line

but of the reception roads as well. Sometimes, but not always, a goods depot is attached to the marshalling yard for local traffic; if not the yard acts as a centre for the distribution of traffic. The tracks in a big yard that are reserved for traffic that has been marshalled ready for despatch are sometimes known as "mileage" sidings.

With Hornby-Dublo track components it is not difficult to lay down quite an effective marshalling yard. The proportions of the Points and their relation to the Straight and Curved Rails make possible neat and realistic effects. Modern yards in actual practice are noted for their clean and symmetrical layout and with Hornby-Dublo track exactly the same results are obtained. The two illustrations previously referred to in connection with the Goods Depot show how well the Hornby-Dublo rails can be assembled into realistic siding and yard layouts.

Passing now to locomotive "yards," as the area around and about the engine sheds are sometimes known, there is not in miniature the same need to distinguish strongly between the path taken by incoming and outgoing engines as there is in actual practice. A much smaller number of engines has to be allowed for, and Hornby-Dublo do not have to follow the same round of fire-dropping, coaling and watering operations as their big relatives. The Hornby-Dublo Engine Shed therefore can be served by two dead-end tracks if space does not permit the shed roads to be made loop lines. The loop line arrangement is better of course as engines can enter at one end of the shed and leave at the other.

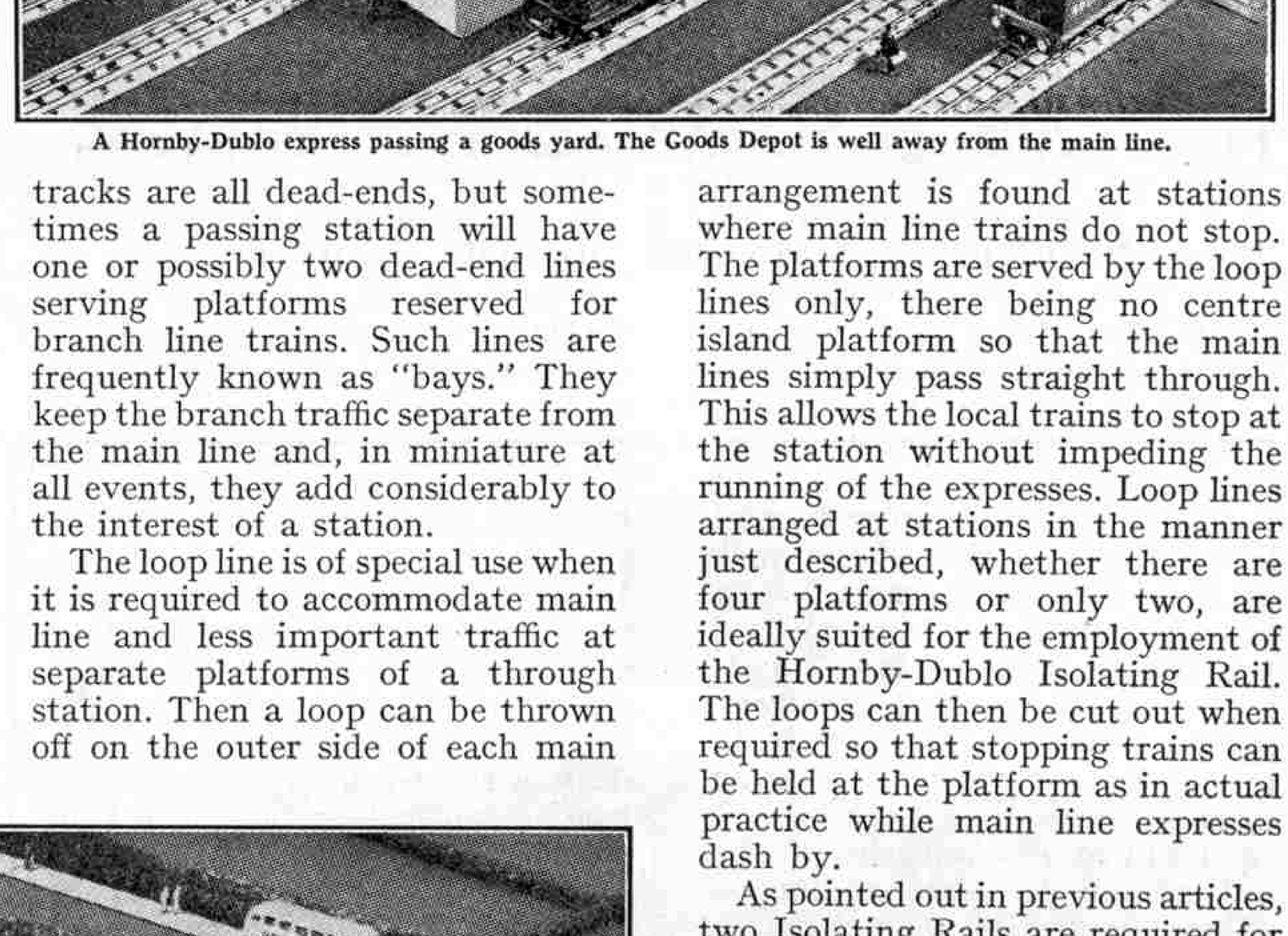
The dead-end type of siding and the loop line each has its own special advantages in connection with passenger stations. At a terminal station naturally the platform tracks are all dead-ends, but sometimes a passing station will have one or possibly two dead-end lines serving platforms reserved for branch line trains. Such lines are frequently known as "bays." They keep the branch traffic separate from the main line and, in miniature at all events, they add considerably to the interest of a station.

The loop line is of special use when it is required to accommodate main line and less important traffic at separate platforms of a through station. Then a loop can be thrown off on the outer side of each main track just before the station, and can join up again after passing through the platforms. Thus the railway, normally double track, becomes four-tracked through the station.

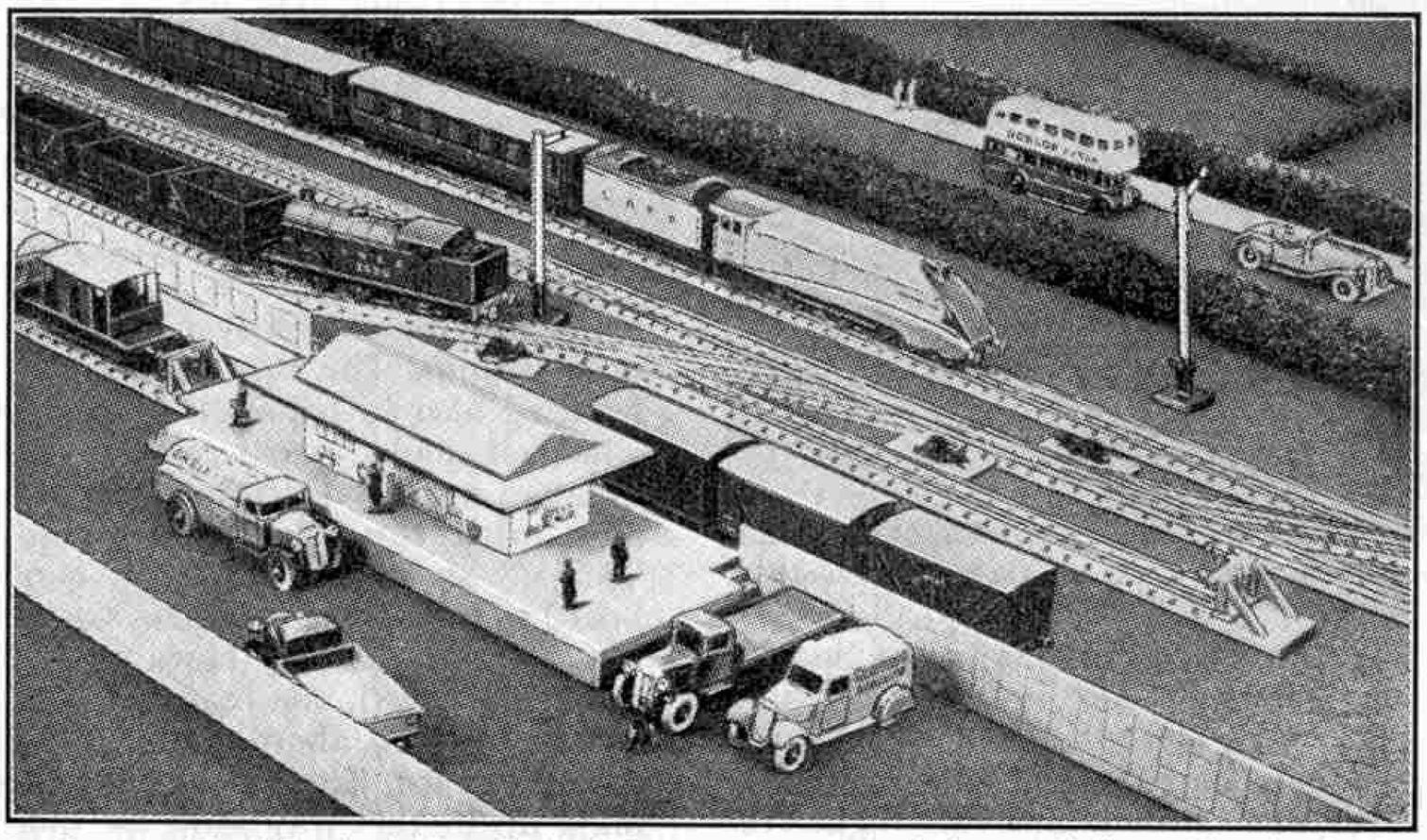
Sometimes a variation of this arrangement is found at stations where main line trains do not stop. The platforms are served by the loop lines only, there being no centre island platform so that the main lines simply pass straight through. This allows the local trains to stop at the station without impeding the running of the expresses. Loop lines arranged at stations in the manner just described, whether there are four platforms or only two, are ideally suited for the employment of the Hornby-Dublo Isolating Rail. The loops can then be cut out when required so that stopping trains can be held at the platform as in actual practice while main line expresses dash by.

As pointed out in previous articles, two Isolating Rails are required for each loop line, one at each end, but only one of them needs to be connected to the Isolating Switch controlling the section thus formed. Dead-end sidings of course need only one Isolating Rail and Switch; but terminal platform lines, or "bays" at a passing station, will require two such Rails and Switches if they are to have a "buffer stop section" at the inner end on which an arriving engine can be isolated as explained in a previous article.

It is great fun to try out schemes like those described in this article, and readers are invited to send in details of their own plans with a view to publication.



A Hornby-Dublo express passing a goods yard. The Goods Depot is well away from the main line.



A well-arranged Goods Depot and sidings. Road vehicles can easily reach the platform, and in the yard there is a shunting spur that keeps train movements in the yard clear of the main line.

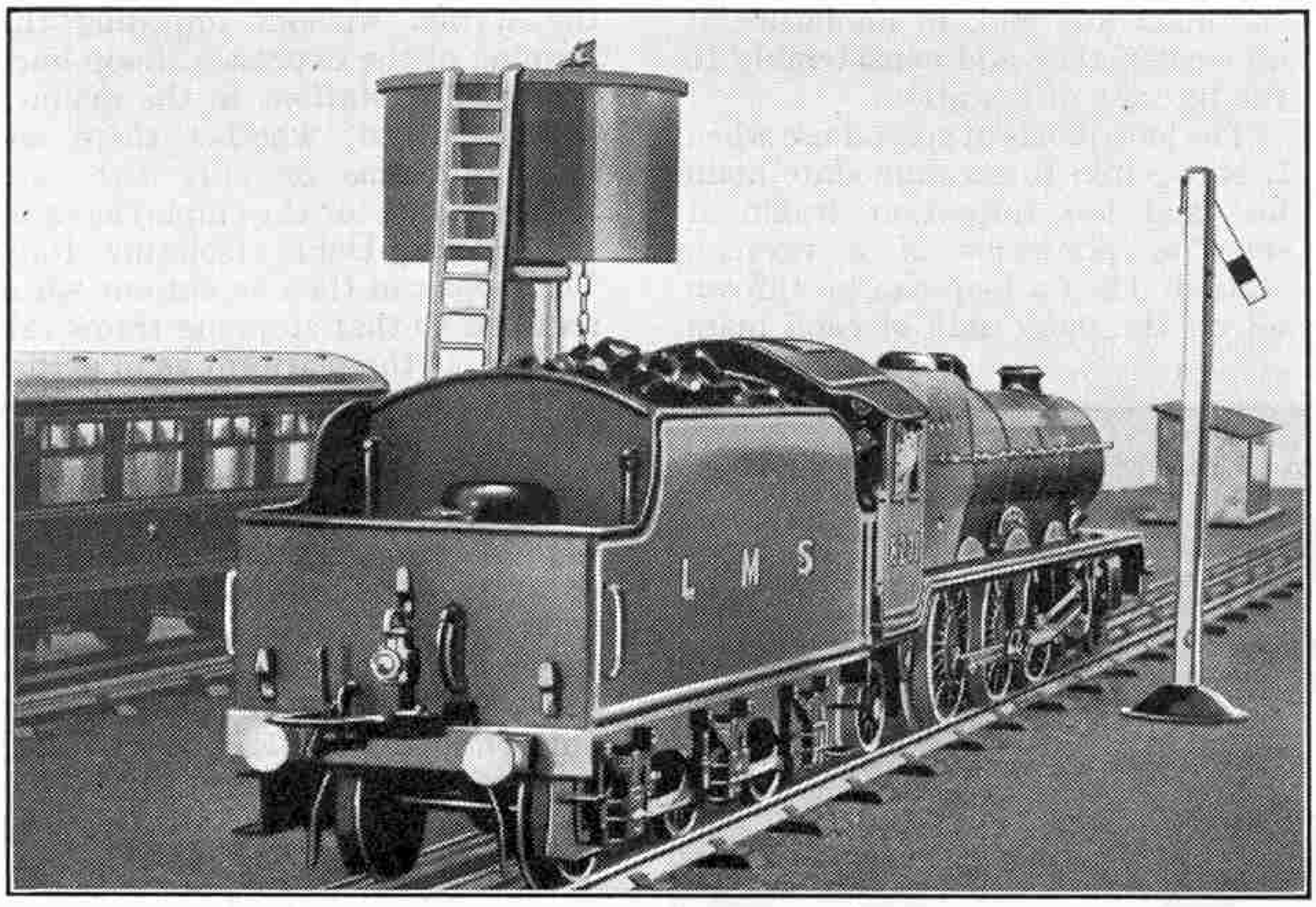
Hornby Gauge 0 Working

Headlamps and other Matters

AMONG the smallest items in the Hornby System are the Locomotive Headlamps and the corresponding Tail Lamps. All the Hornby Locomotives from the M3 Tank upward are provided with brackets for Headlamps, and many of the better quality Coaches have brackets for Tail Lamps. It is most fascinating to be able to put the Lamps in place and to remove them or alter their position in accordance with actual practice. In general the class of train—whether express, stopping, through goods and so on—is indicated by the position of the lamps carried on the front of the engine. The positions are laid down by the British Standard Headlamp Code and a table giving the necessary details of this is included in the H.R.C. Senior Booklet so that Hornby Railway owners can "lamp" their trains in the correct manner.

An interesting point is that a "light engine," that is an engine travelling on its own, or a light engine and brake van, constitute a train and so have a special lamp indication. Thus the "*Princess Elizabeth*" Locomotive shown backing down over the main line in the illustration on this page carries the "light engine" indication, one lamp being placed on the centre bracket above the buffer beam. As the tender is leading, the lamp is carried on the tender, and to be quite correct a red tail lamp should be placed on the corresponding bracket at the front of the engine. On the arrival of the engine at the station where it is to pick up its train the lamp would be removed from the tender.

To indicate an express train a lamp would be placed on each of the brackets above the engine buffers. The tail lamp would be removed from the engine front at the same time. Some model railwaymen place lamps that are not in use on top of the tender tank; or they can be hung by means of their wire handles on the brake and water pick-up controls in the No. 2 Special Tenders. Then they are ready to hand when next required.



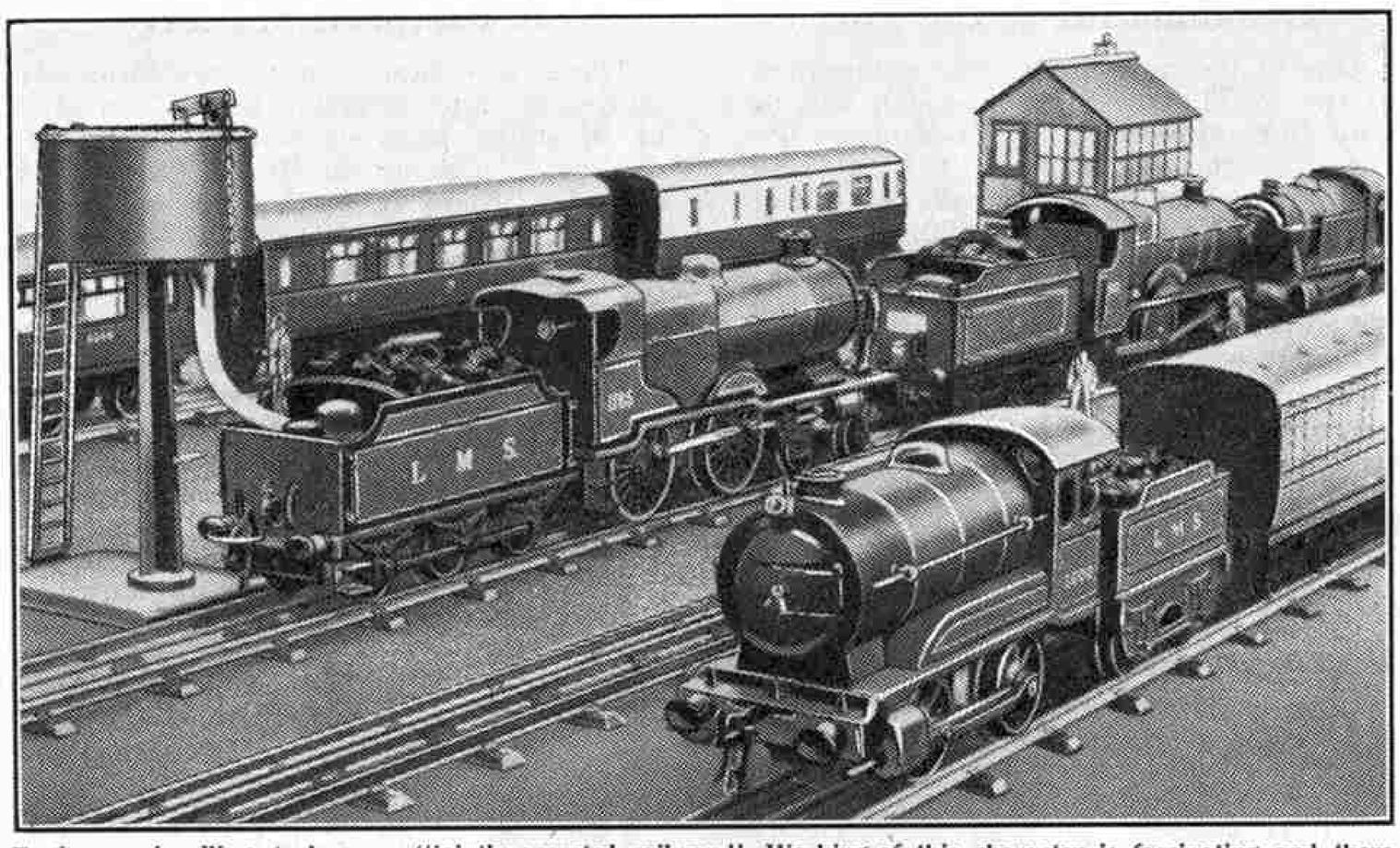
"Princess Elizabeth" backing down from the sheds to the main station to pick up its train. The tender is loaded with Hornby Coal and carries the headlamp in the "light engine" position.

As most readers know, the Southern Railway do not employ the Standard Headlamp Code. Their engines carry white discs in the daytime and lamps at night to indicate the routes the trains are following. Special miniature discs are provided with the Hornby S.R. "Eton" Locomotives, but for those who have not one of these engines in service it is not difficult to make suitable discs from white card. A small loop of gummed paper attached at the back will provide a means of fitting the discs to the engine brackets.

With regard to the actual routes, readers can find out by observation the codes in use on different parts of the system. Space forbids the publication of any list of all the indications in use, but the H.R.C. Headquarters staff can usually supply information regarding a particular route in which a reader may be interested. Long lists, however, cannot be undertaken.

No special rule need be followed in miniature for the placing of tail lamps on the end coach of a train. Two brackets are provided at each end of the No. 1 and No. 2 Passenger Coaches and the No. 2 Corridor Coaches. There is no need to place a lamp on each bracket at the end of a train; one is usually considered sufficient nowadays. Two may be used on any special high-speed trains that the miniature railway owner may run, thus following the practice of the L.N.E.R. in normal times.

We have in previous articles in this series dealt with the provision of miniature loads for Hornby goods trains. Coal trains are readily made up, using the special Hornby Coal for freight. This material does away with the use of real coal, which at the best is heavy and messy; and on a temporary line it is a positive menace to the carpet over which the railway runs! The Hornby Coal can be used also in locomotive tenders where it looks most realistic. To obtain a neat, well-trimmed appearance with this "fuel," a dummy "shape" should be made of cardboard to fit inside the tender. On the top surface of this Hornby Coal should be glued, the material being heaped slightly about the centre of the coal space. Engines with tenders filled up in this way look far more business-like than those that make



Engines and rolling stock on a "jointly-operated railway." Working of this character is fascinating and there are immense possibilities for realistic effects.

their journeys with empty tenders behind them.

With the coal supply for locomotives is also associated the provision of water. Hornby Locomotives do not need water any more than coal but engines should be made to halt at the Water Tank at intervals during their "working hours." It is far more realistic if the engines "take water" before leaving the shed premises and when going off duty again. If a Tank is provided at the platform ends of through stations, engines could also "fill up" while standing at the platform. Stops for water can be made a feature of the running programme and the routine of train and station working will be made more interesting as a result.

A suggestion for readers who are on the lookout for something novel in train working is to operate a "stores train." Such trains run regularly in actual practice, taking stores, parts and material of different kinds from central depots in various districts to the out-stations. These trains are made up as a rule of miscellaneous vans, a wagon or two and a passenger brake van. On a Hornby system an Open Wagon covered with a Wagon Tarpaulin, a No. 1 and a No. 2 Luggage Van and a No. 1 Guard's Van would be a suitable composition for a stores train. The Luggage Vans could be loaded with miniature cases made of blocks of wood, supposedly containing various small articles: small casks, barrels for "lamp oil," and so on also could be conveyed. The loading and unloading of these items direct on to the platform of a passenger station would be a change from the usual shunting into the goods yard necessary with freight trains.

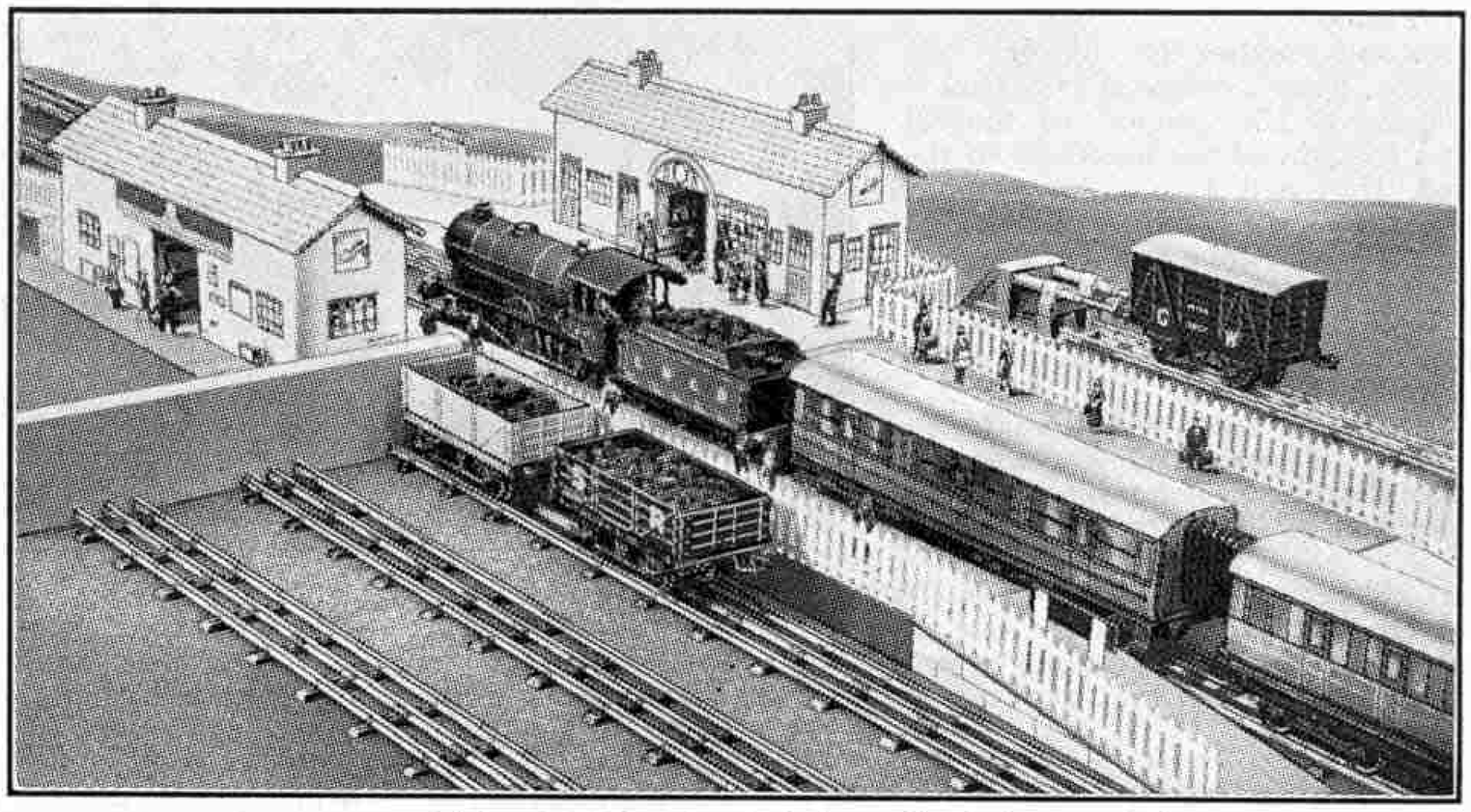
Replacements in the shape of locomotive parts for the engine sheds are frequently conveyed by stores train and left at stations convenient to the depots concerned. Thus any odd engine fittings—coupling rods perhaps or a chimney from a scrapped locomotive—can be loaded into the Open Wagon. Such a train could be run at regular intervals, say once during each period of operations. On a system with plenty of rolling stock to spare, several vehicles of the required types could be kept specially for "stores train" duties.

As a general rule each model railway owner favours a particular group and reproduces its practice as far as possible. Sometimes, however, the practice of two groups have an equal appeal, and so the engines and stock of both are represented on the layout. This also occurs very often when two or more miniature railway "managers" combine their stock to form one big system. Conditions then are ideal for "joint working," the railway then representing a real or imaginary joint system, or at least a stretch of line on which the engines and stock of two companies are to be seen.

Many interesting possibilities then present themselves in the way of train working. Through coaches working from one parent system to the other can be operated, and combined trains made up of the rolling stock of both companies can be assembled. The engines of each company can work in turn on the various trains, and realistic schemes can be developed on the lines of the real through services normally operated between the northern districts and the south and west.

Some idea of the locomotive and stock combinations possible are shown by the upper illustration of this page. Both L.M.S. and G.W.R. Coaches are standing in the sidings, and the locomotives of both systems are lined up taking turns at the Water Tower. The photograph might well represent the Chester, Bristol or Shrewsbury district in miniature, for at each of these places L.M.S. and G.W.R. interests are clearly combined. There is something specially appealing about a miniature North to West express such as the *"Devonian"* and the important through trains that connect Liverpool and Plymouth.

Further realism can be added by making suitable name or destination boards for the vehicles of such services.



An interesting station scene on a miniature L.N.E.R. system. Note the yard in the foreground with the wagons standing loaded with the coal supply for the station.

New Dinky Toys

This month three important additions are made to the range of motor cars in the Dinky Toys series. The first of these is a miniature of the famous Frazer-Nash-B.M.W. Type 328 2-litre Sports Car (Dinky Toys No. 38a). The actual car is a high-speed open two-seater capable of a maximum speed of 100 m.p.h. It is fitted with a six-cylinder engine rated at 16 h.p., and has won many successes in motor sports, including the Shelsey Walsh Hill Climb. The Dinky Toys model is an excellent reproduction of this famous car, and is sure of a great reception from collectors of these fascinating miniatures.

The other new models represent the Sunbeam-Talbot 3-litre Sports Car (Dinky Toys No. 38b) and the Alvis Sports Tourer (Dinky Toys No. 38d). The Sunbeam-Talbot is one of the best equipped cars on the road. The 3-litre model has a 6-cylinder side valve engine rated at 20 h.p., and a chassis wheelbase of 9 ft. 10 in. The Alvis is one of the most popular luxury cars of the sports type, and is designed to combine high performance with a distinctive and refined appearance. It has a six-cylinder engine rated at 30 h.p., and is capable of speeds of well over 100 m.p.h.

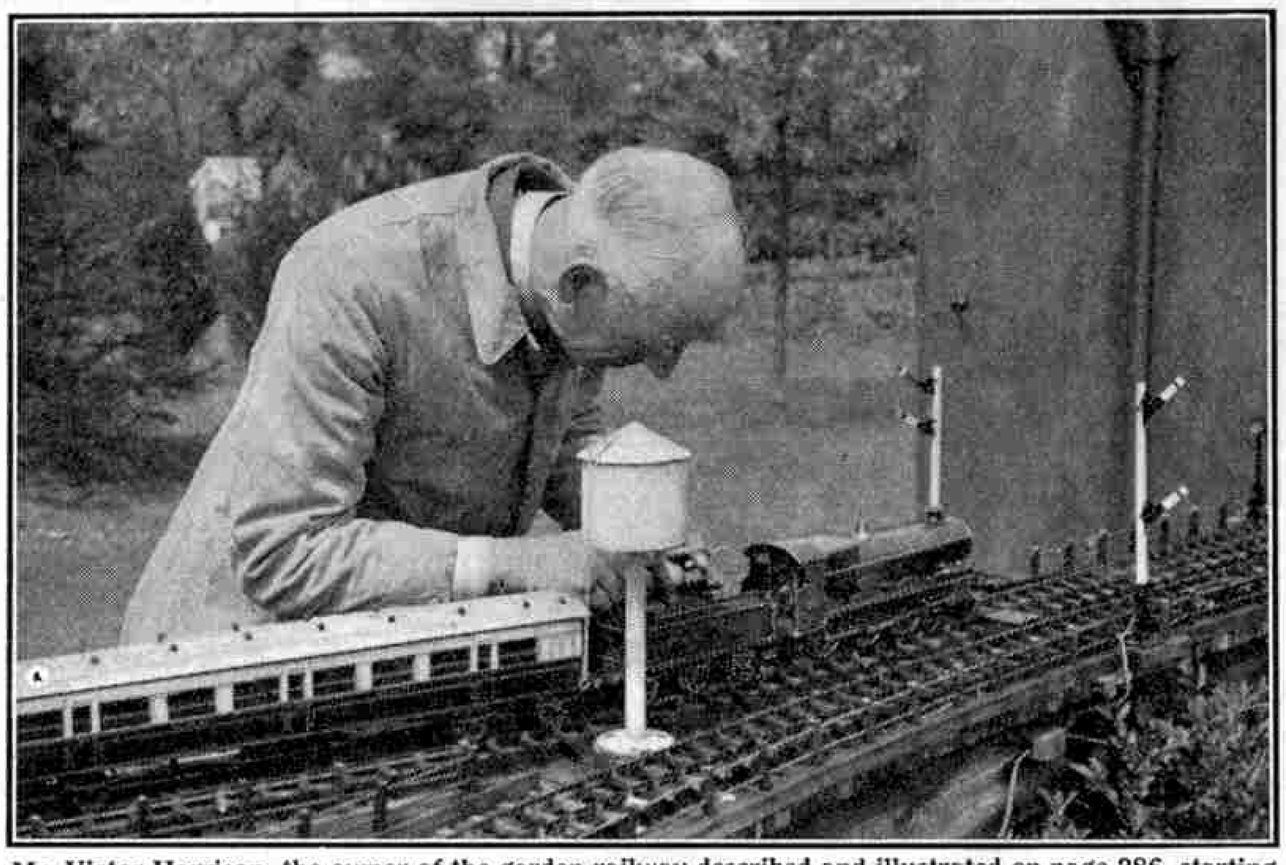
By Submarine to the Pole

One of the most interesting submarines in the world, now being planned, will be only 48 ft. long and 8½ ft. in diameter. Its crew will consist of four men. It is expected that this pocket submarine will be built at Edmonton, Canada, some 1,500 miles from the sea.

The designer of this strange submarine is Sir Hubert Wilkins, the famous Australian explorer who has made many famous flights across Arctic regions. Now he proposes to dive beneath the ice floes that cover the Arctic Ocean in order to reach the Pole. He hopes to take his submarine northward along the course of the Mackenzie River, which will give him easy access to the ice-covered seas. If he cannot do this it will be necessary to build his craft on the Pacific coast, and the route to the Arctic then will be much more dangerous to traverse.

Sir Hubert's vessel will have an electrically heated conning tower that can be extended upward to melt its way through the pack ice, and a tiny lift will carry the explorers to the surface.

The reason for using a submarine is that with it the explorers can stay at the Pole for some time, taking observations and making measurements. A permanent camp cannot be established there on the ice, for the drift quickly carries it southward.



Mr. Victor Harrison, the owner of the garden railway described and illustrated on page 286, starting up his gauge 1 G.W.R. steam locomotive "Titley Court."

A Footprint Mystery

There are many more mysteries of footprints than detective novels can give us. Mystery prints are said to have been discovered high up on Mount Everest, at altitudes where it is thought no living creature could possibly survive. Natives of the Himalayan region put these down to the Abominable Snowman, who seems to be a mythical creature.

More definite prints discovered in rocks are fossil footmarks, and have been traced to reptiles and other creatures that existed on our Earth millions of years ago. There still remain unknown prints, however. Certain markings strangely like human footprints are continually being found in various parts of the United States on the surfaces of exposed rocks. They are from five to ten inches long and have been given a name to indicate that they look human and are matters for wonder.

Giving the footprints a name does not solve the mystery of their origin. If they were made by any creature resembling a human being then our race must be considerably older than we thought, some 250 million years instead of the mere million now accepted. They may have been made by one of the strange creatures of those early times, when dinosaurs of gigantic size but little brain dominated the Earth. If so, then some yet unknown animal of prehistoric times had five toes and a very well-marked heel. There is a third possibility. This is that the marks were carvings made by Indians of bygone ages, however, and that the mysterious foot is the symbol for water, which is always to be found in the neighbourhood of the places where prints are discovered.

With the "Hampdens" to Stavanger—

(*Continued from page 273*)

through the cockpit and just missed him.

The rear gunner appeared at his shoulder, having crawled forward to report.

"Our fellows O.K. sir," he heard. "Can't see the other six anywhere." That didn't worry him. They wouldn't hang about to return in formation, lest enemy fighters appeared.

"What damage could you see?" he asked.

"I think Potts (the lower gunner) and I got some of their fire-fighters, and the sergeant must have had an incendiary left, for he gave 'em another on the way back, right among those Messerschmitts at the end of the 'drome."

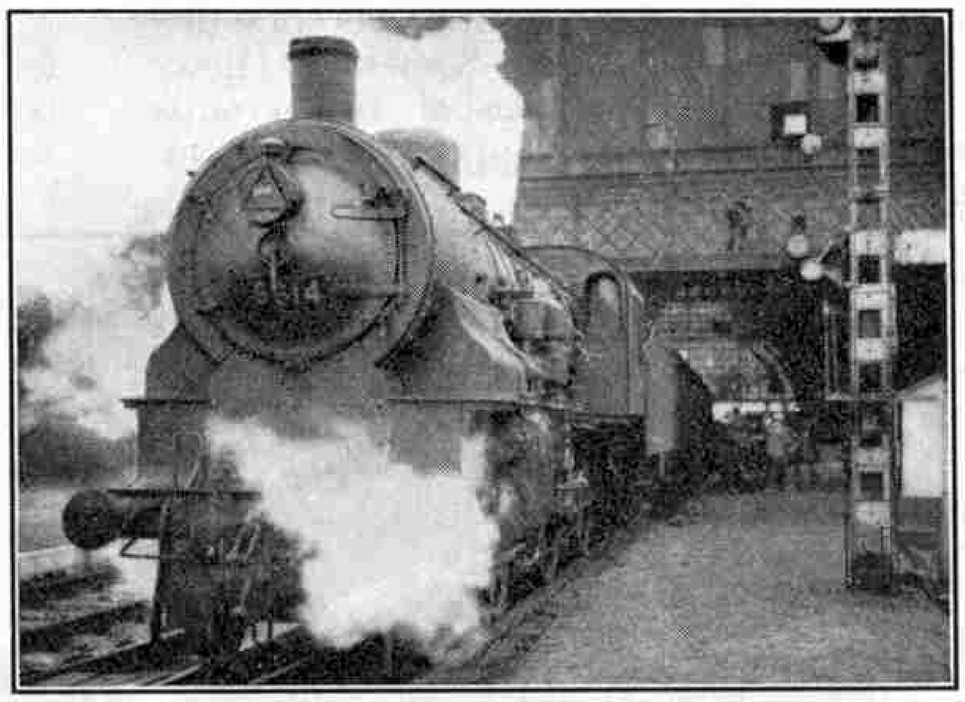
"Good," replies his officer. "So we may have a peaceful trip back."

Peaceful! He grinned to himself as he thought of the inaptness of the word. They had done a vast amount of damage, and dealt a blow that would do something towards hampering Hitler's plans for the conquest of Scandinavia. But he must carefully conceal his joy from those youngsters at home.

"Yes," said he some hours later to a group of young officers who no longer disguised their respect for the veteran leader of this brilliant exploit. "It all went off pretty well. The Hampden suits old men like me—arm-chair comfort and all that sort of thing. Now, if you blokes had had to go raiding in an open cockpit with the old F.E. at seventy miles an hour . . . . . "

* * * *

The Handley Page "Hampden" carries its bomb load in the fuselage, below the wings. It is armed with four machine guns.



A Brussels-Ostend train leaving Bruges. The engine is one that was handed over to Belgium by Germany after the Great War. Photograph by D. S. Barrie.

Layouts for Gauge "00" Enthusiasts

Our advertisers Bassett-Lowke Ltd. have issued four plans for the Gauge "00" model railway owner. These are drawn to a scale of 1½ in. to 1 ft., and include station plans and wiring diagrams in addition to showing track details. Each layout is planned to occupy a definite space. In one of them the controls are operated from a well in the centre, but in the others extra space must be allowed for this purpose.

The prints are published at 1/9 each, and can be obtained direct from Bassett-Lowke Ltd., Northampton, or from the firm's branches at 112, High Holborn, London W.C.1, and 28, Corporation Street, Manchester. The "*M.M.*" should be mentioned when writing.

Photographic Prize Winners

The following are prize winners in the "November Photographic" Competition organised by our advertisers Johnson and Sons, Hendon, London N.W.4:

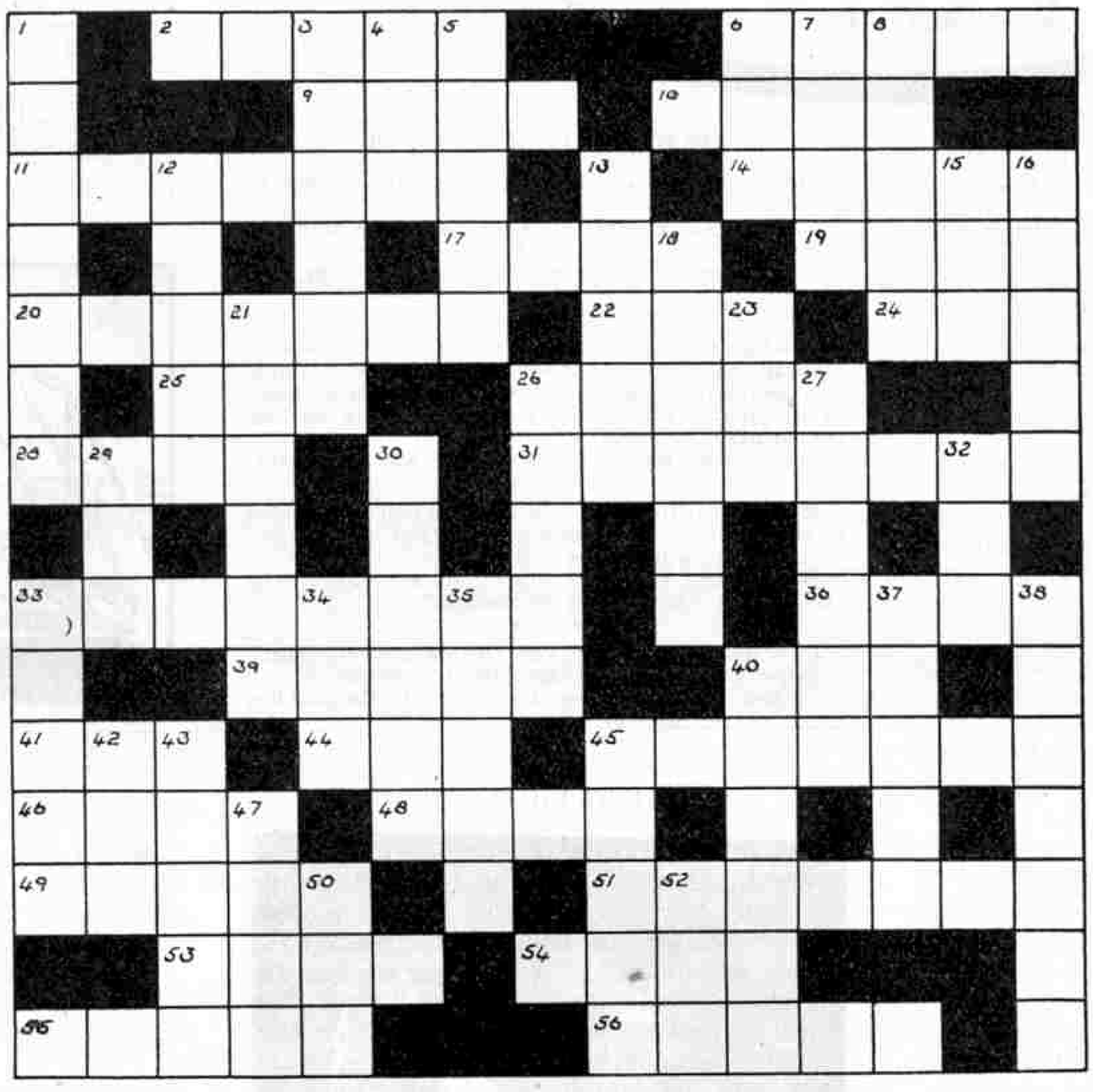
First Prizes of £3 each: Mrs. D. E. Newham, Norcove, Victoria Parade, Scarborough; Mr. M. Popplewell, 39, Scholes Park Drive, Scarborough.

Second Prizes of £2 each: Mr. A. G. Dell, 88, Casewick Road, W. Norwood, S.E.27; Mr. H. Mortimer, c/o Officer in Charge, L.C.C. Fire Station, 214, Pavilion Road, S.W.1.

Third Prizes of £1 each: Mr. T. Edmondson, 21, Limes Road, Folkestone; Mr. S. J. Brown, 12, Carisbrooke Crescent, Barrow-in-Furness; Mrs. M. Robinson, 4, John Street, Thornton, Bradford.

Competition Corner

JUNE CROSSWORD PUZZLE



CLUES ACROSS

2. Refuse
6. To wash away
9. A precious stone
10. A loud sound
11. Narrow
14. Sour substances
17. Large jug
19. Call
20. Attack
22. The quarter towards which the wind blows
24. Mineral spring
25. A spike
26. Quench
28. Rent
31. A story writer
33. One who detects
36. A square in a pattern
39. Countrified
40. Poisonous snake
41. Sports implement
44. Rodent
45. Makes dear
46. Contracting diaphragm
48. Decayed vegetable matter
49. A doctrine held to be true
51. Pistol case
53. To be ardent
54. Yield
55. A kind of wheat
56. Led back

CLUES DOWN

1. Moment
3. Cattle food
4. Imitate
5. Lying-places
6. Pasturage
7. Every one
8. Otherwise
12. Willing
13. Greeting
15. To lower and raise again
16. Oblique
18. Robber
21. Noisy talker
23. Likewise
26. Growl
27. Glide away
29. Source of metals
30. Catch
32. The centre of a system
33. Debt
34. Worthless dog
35. Of oatmeal
37. Aside
38. Makes sure
40. Putrid
42. 100 square metres
43. Colour
45. Supposed to fill all space
47. Deception
50. Add
52. Song

This month we give another of the popular "*M.M.*" crossword puzzles, which follows the lines of those set in previous issues. The clues are all perfectly straightforward, and every word used can be found in Chambers' or any other standard dictionary.

Prizes of Meccano products to the value of 21/–, 15/–, 10/6 and 5/– respectively will be awarded in order of merit to the senders of the four correct solutions that are neatest or most novel in presentation. The prizes will be duplicated for the Overseas section, which is open to all readers living outside the British Isles and Channel Islands.

Entries should be addressed "June Crossword Puzzle, Meccano Magazine, Binns Road, Liverpool 13." The latest date for receiving entries is 29th June in the Home section and 30th September Overseas.

June Photographic Contest

Here is the third of our series of photographic competitions for 1940. The conditions ruling in this contest are very simple. Competitors are asked simply to submit photographs in each contest, and the prizes will be awarded to the best sent in. Entries may be outdoor scenes, or examples of indoor photography, but in each case an appropriate title must be written on the back of each. An entry may consist of more than one photograph, but no competitor can be awarded more than one prize in any one monthly contest.

War conditions have brought certain restrictions on outdoor photography. These apply to military, naval and Air Force subjects, and readers should take care to avoid photographing such things as docks, barracks, aerodromes and troops on the march. An article that appeared on page 200 of the April issue gives useful guidance on these points.

Each month's entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. In each section prizes of Meccano products or photographic material to the value of 21/– and 10/6 respectively will be awarded. There will be two similar sections with prizes of the same value for Overseas readers.

Entries in this month's competition should be addressed "June Photo Contest, Meccano Magazine, Binns Road, Liverpool 13." The closing date in the Home section is 29th June and that in the Overseas section is 30th September.

Competition Closing Dates

HOME

June Crossword Puzzle Contest		29th June
June Photographic Contest	...	29th June

OVERSEAS

March Crossword Puzzle Contest		29th June
March Drawing Contest	...	29th June
April Hidden Titles Contest	...	31st July
April Photographic Contest	...	31st July
May Advertising Slogans	...	31st August
May Photographic Contest	...	31st August
June Crossword Puzzle Contest		30th September
June Photographic Contest	...	30th September

COMPETITION RESULTS

HOME

"April Photographic Contest."—First Prizes: Section A, M. TUCKER, Reigate; Section B, W. J. PRESTON, Alva. Secnod Prizes: Section A, A. G. DELL, London S.E.27; Section B, G. STOPP, Minehead. Consolation Prizes: W. BARR, Birkenhead; R. E. HOGBEN, River-in-Dover; W. B. HUDSON, Shrewsbury; Miss ANGELA PAIN, Birkenhead; E. RICHARDSON, Nottingham; H. RICHARDSON, Lytham; J. TAYLOR, Bradford.

There was a splendid entry in this Contest, and the quality of the photographs submitted in Section A was so high that the Second Prizes were increased to 15/–. The number of Consolation Prizes was increased, and the winners of these received 7/6 each.

"April Hidden Titles Contest."—1. W. K. COCKING, Redruth. 2. J. HOLD, Barnsley. 3. H. Cox, Dudley. 4. R. J. BIGGS, Bristol 6. Consolation Prizes: F. S. NEWSON, Luton; G. PATTERSON, Manchester 8.

OVERSEAS

"January Cover Voting Contest."—1. R. A. WILLIAMS, North Island, N.Z. 2. R. P. MYBURGH, Claremont, S.A. 3. R. VAN BERKUM, Ontario, Canada. 4. G. N. FESTENSTEIN, Transvaal, S.A. Consolation Prizes: G. MYBURGH, Claremont, S.A.; W. L. TSUN, Transvaal, S.A.

"January Advertisement Contest."—1. T. A. WADE, Johannesburg, S.A. 2. M. MOST, Pietermaritzburg, S.A. 3. P. F. SMITH, South Australia. Consolation Prize: R. VAN BERKUM, Ontario, Canada.

FIRESIDE FUN

THE LIMIT

Politician: "And now, gentlemen, I wish to tax your memories."

Man in the audience: "Good heavens, has it come to that?"

* * * *

Lady: "Three two-pound lobsters, please."

Man: "Yes, ma'am. Shall I wrap them up?"

Lady: "I think you had better. I don't think they know me well enough to follow me home."

* * * *

Corporal of the Guard: "They haven't blown 'Lights Out' yet, Sir."

Very young Subaltern: "Well—er—I shouldn't wait; just blow them out yourself, Corporal."

* * * *

A man was seen sitting on a railway embankment in the west of Ireland. A passing tourist said to him: "Don't you find life very lonely?"

"Not at all, sir," he replied.

"Well, what do you do with yourself?"

"Sure, I watch the trains go by."

"But how many trains go by each day?"

"Just the wan, sir."

* * * *

Employer: "Biggs, you have now been in our employment for 40 years. To mark our appreciation of your length of service and unswerving loyalty, you will henceforth be addressed as 'Mr. Biggs'."

* * * *

Diner (irritably): "Say, waiter, how long do I have to wait for that half-duck I ordered?"

Cockney Waiter: "Till somebody orders the other 'arf. We can't go killin' 'arf a duck."

* * * *

Two recruits were pegging down a tent; one was holding the pegs for the other to hit.

Attempting to give a peg a hefty blow, the man with the mallet slipped and caught the other a nasty blow on the head.

Rising, the man with the bump whispered to the other: "Don't muck about. The sergeant's watching us!"

* * * *

The Convict: "Look here, warder, somebody has stolen one of my blankets."

Warder: "Good heavens! You don't suggest we have any thieves in the prison, do you?"

* * * *

Teacher: "I'd like to go through a whole day without scolding or punishing you."

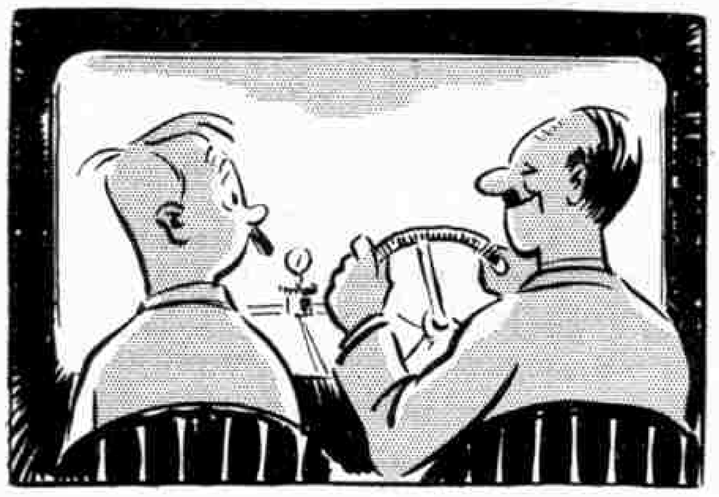
Johnny: "Well, you have my permission."

* * * *

Sign in a Texas restaurant: "If our steak is too tough for you, get out. This is no place for weaklings."

* * * *

KNOCKED OUT



"You don't notice that knock in the engine so much now, do you?"

"No. How did you fix it?"

"Oh, I just loosened one of the mudguards!"

* * * *

Recruit: "The major is always picking holes in me."

Corporal: "Well, you came here to be drilled, didn't you?"

MAKING HIM USEFUL

Hotel Proprietor: "Do you want the porter to call you?"

Guest: "No, thanks. I awaken every morning at seven."

Proprietor: "Then would you mind calling the porter?"

* * * *

Driving in the black-out, a lorry-driver became more and more annoyed as he kept dodging pedestrians.

At last, leaning out of his box, he shouted to one man: "Here, mate, why don't you try walking on the pavement?"

"I'm waiting for you to come off it," was the answer.

* * * *

Mother (to little Betty, who has been sent home owing to indisposition of schoolmistress): "But I hope you were sorry your teacher was ill."

Betty: "Oh, I was, mummy, but I couldn't help clapping my hands under my breath."

* * * *

Customer: "I want to return this washing machine."

Salesman: "What is wrong with it, madame?"

Customer: "Every time I get into it the paddles knock me off my feet."

* * * *

COMING OR GOING?

Courtly Old Gentleman (picking up old lady he has knocked down in blackout): "Oh Madam, I offer you my profound apologies, I need hardly say—"

Old Lady: "Aw, never mind about all that, mister. Which way were I facin'?"

* * * *

A certain solicitor was always lecturing his office boy, whether he needed it or not. One day he heard the following conversation between his office boy and the one next door:

"How much do you get?" asked the latter.

"Oh, £300 a year."

"Wha-a-a-t!"

"Yes, 15/- a week and the rest in legal advice."

* * * *

The boy we like
Is Wilbur Henn;
He's heard the joke—
But he laughs again!

* * * *

Sergeant (after dinner): "Any complaints?"

New Recruit: "Yes, there was some grit in my soup."

Sergeant: "That won't kill you."

New Recruit: "Maybe not, but I joined up to fight for my country—not to eat it!"

* * * *

Truck Driver, after barely avoiding a crash: "Why didn't you signal before you turned into that gateway?"

Girl: "Why, stupid, I always turn in here."

* * * *

Wife: "I want a cigar for my husband."

Shop Assistant: "Fairly strong?"

Wife: "Yes, please. The last one broke in his pocket."

* * * *

THIS MONTH'S HOWLER

Shakespeare lived at Windsor with his Merry Wives.

REAL DOPE

Professor: "What is the most potent poison?"

Student: "An airplane; one drop and you're dead."

* * * *

Father: "Yes, that lion could kill me with his paw and eat me up."

Little Elsie (wide-eyed): "Daddy, if the lion comes out of his cage and eats you up, which bus do I take home?"

* * * *

A business man advertised for an office boy. The next morning there were some 50 boys in line. He was about to begin examining the applicants when his secretary handed him a card on which was scribbled: "Don't do anything until you see me. I'm the last boy in line, but I'm telling you I'm there with the goods." That boy got the job!

* * * *

Doctor: "You should take a bath before you retire."

Patient: "But, doctor. I don't expect to retire for at least 20 years yet."

* * * *

A SAFE PLACE

Passenger: "I read in this newspaper that there's a madman at large."

Pilot: "Hee, hee, hee! They'll never think of looking for me up here."

* * * *

With tears on her cheeks little Winnie ran up to the policeman. "Please," she sobbed, "will you come and lock a nasty man up?"

"What's he been doing?" asked the policeman.

"Oh, he's broken my hoop with his nasty bicycle."

"Has he?" said the constable. "Well, where is he?"

"Oh, you'll easily catch him," explained Winnie, triumphantly. "They just carried him into that chemist's shop."

* * * *

Brown: "What will you give me for my daughter's piano?"

Neighbour: "£100, sawn, split and delivered!"

* * * *

Only two seats were vacant on the bus, the other three being occupied by three small and rather thin ladies.

As two "heavy-weights" squeezed in, one of the ladies said: "It's a pity they don't charge by weight."

"If they did, Miss, buses would never stop to pick you up," was the retort.

* * * *

Mother (to son wandering round room): "What are you looking for?"

Son: "Nothing."

Mother: "You will find it in the box where the chocolates were."

* * * *

A nurse in a mental hospital saw a patient with his ear close to the wall, listening intently. The patient held up a finger as a warning for him to be very quiet; then beckoned him over and said: "You listen here."

The nurse put his ear to the wall and listened for some time, then turned to the patient and said: "I can't hear anything."

"No," said the patient, " and it's been like that all day."

* * * *

Tommy was not paying attention to the lesson when teacher swooped upon him.

"What is the meaning of the phrase. 'The shark's hungry maw'?"

But the lad's ready wit came to his aid.

"Its starving mother, sir," he replied hopefully.

* * * *

The fond mother wrote to her son who was on military service:

"I hope that you have now learned to get up punctually every morning, so that you do not keep the whole battalion waiting for breakfast."

* * * *

Long-winded Lecturer: "If I have talked too long it's because I haven't my watch with me, and there's no clock in this hall."

Voice from audience: "There's a calendar behind you."

Lots in a name!

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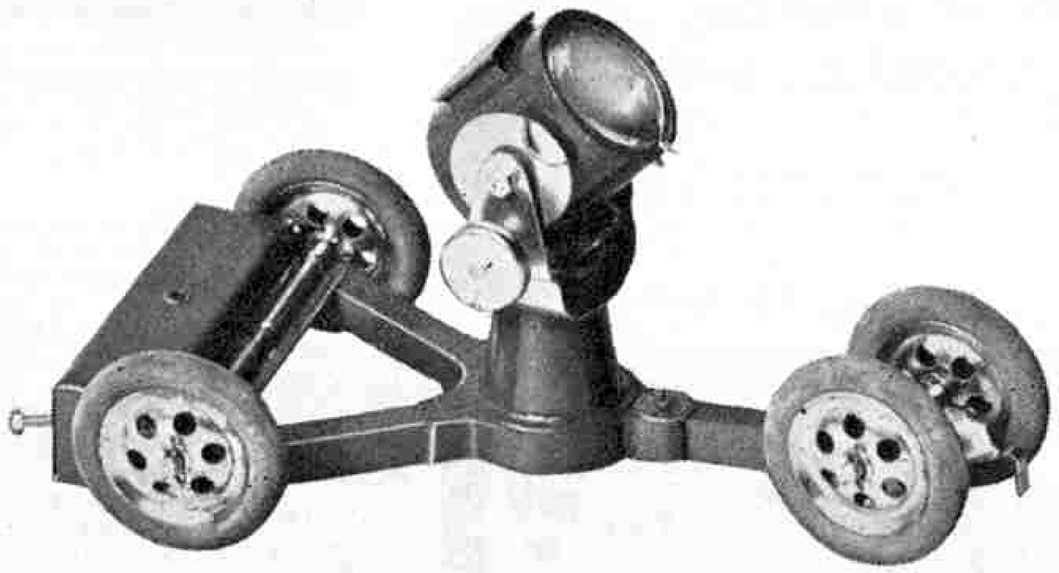

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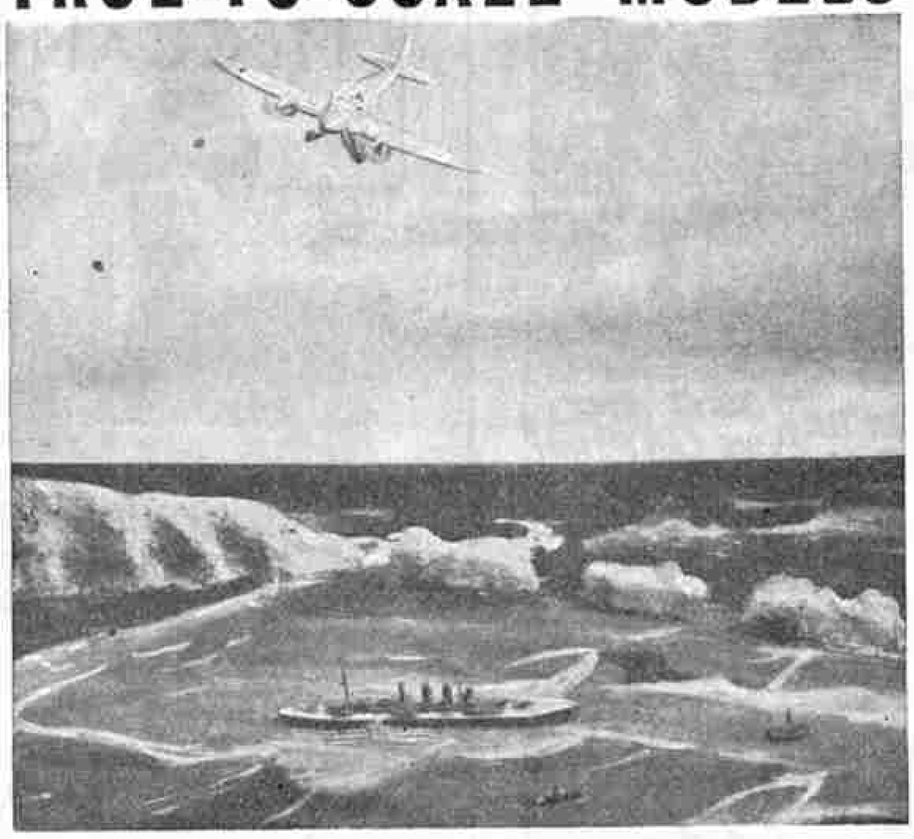

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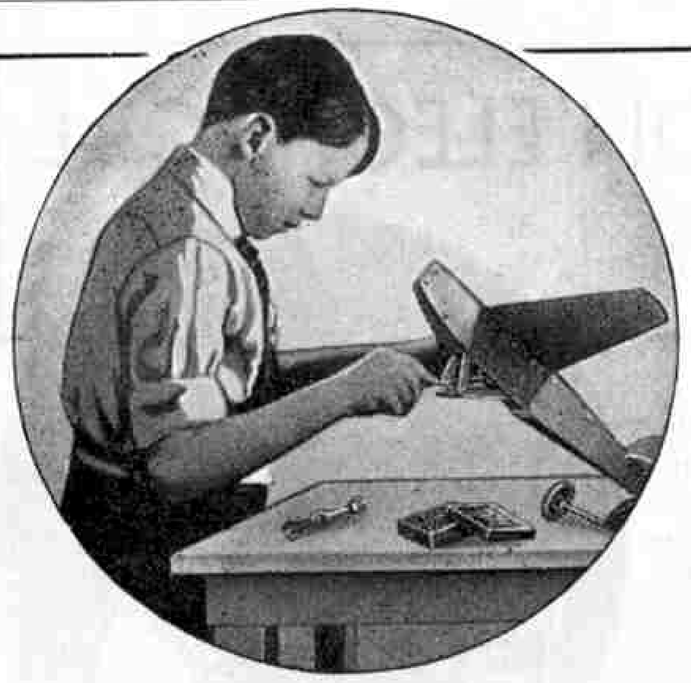

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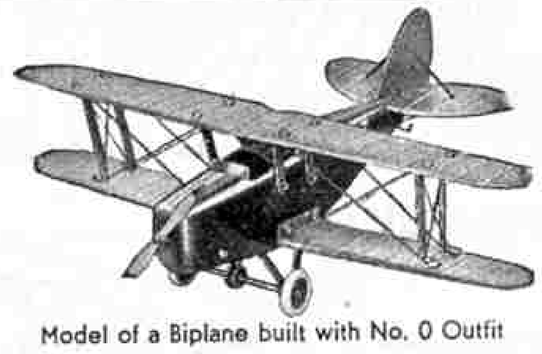

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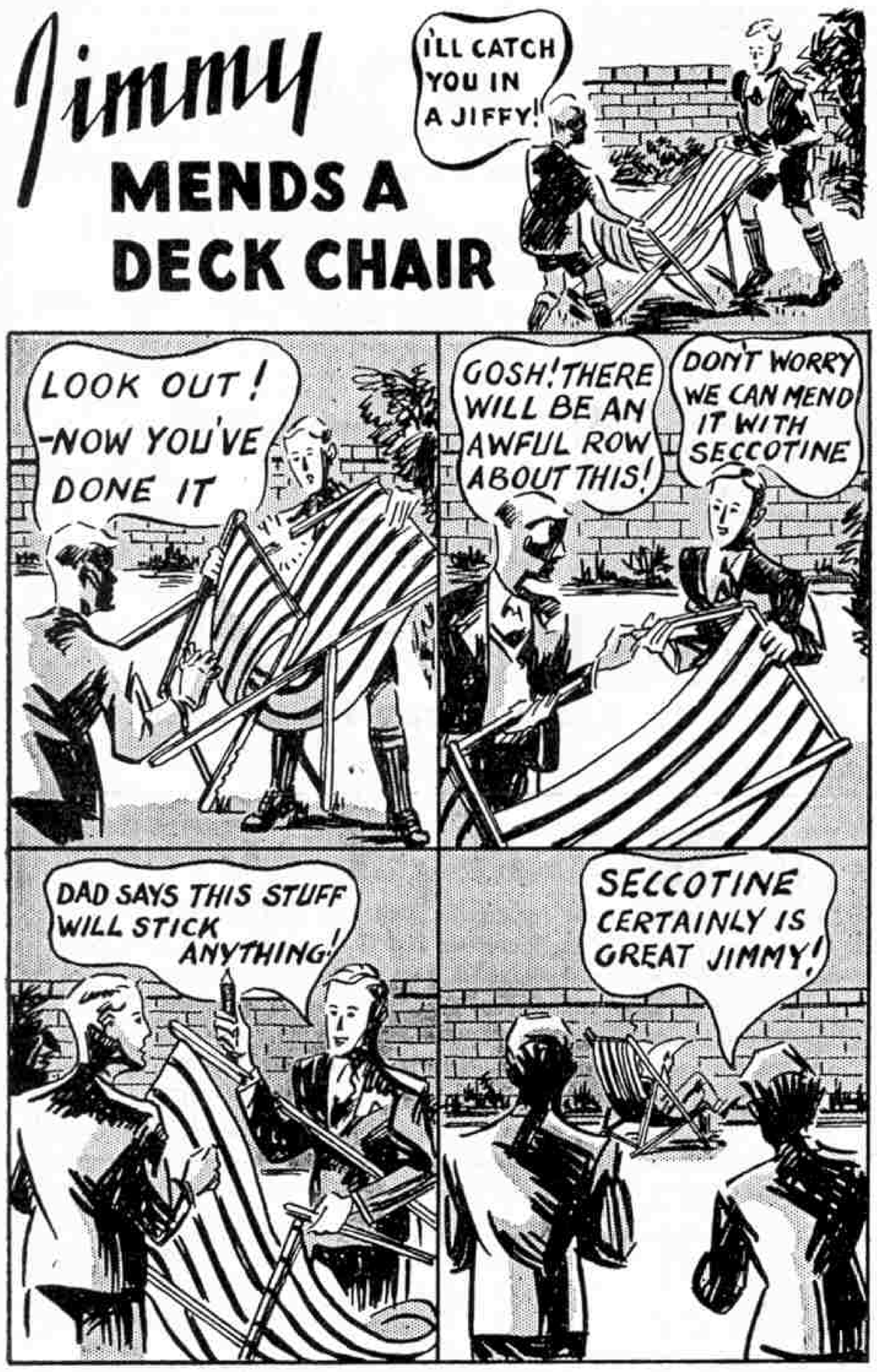
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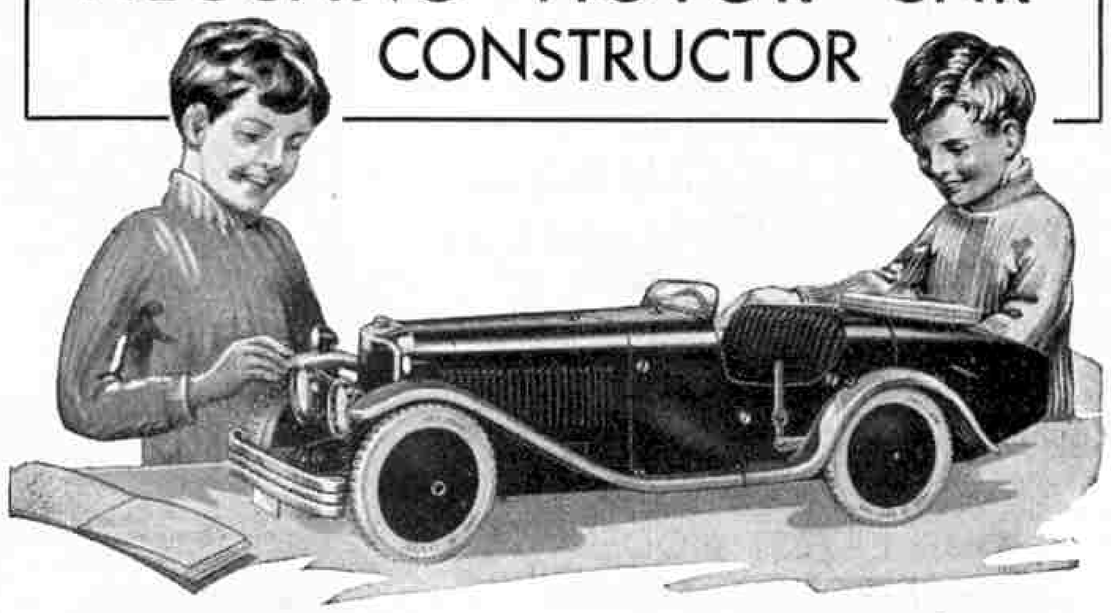

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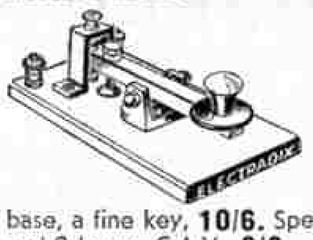

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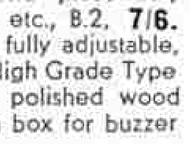

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This Month's Special Articles

	Page
Air News	284
Along American Airlanes—I	278
Books to Read	288
Competition Corner	315
Engineering News	274
Fireside Fun	316
From Our Readers	292
Guild Pages	302–3
Hornby Railway Company Pages	307–313
"Let's Feed the Gulls"	270
Meccano Diesel-Engined Motor Tractor	294
Meccano Model-building Competitions	300
Meccano Model-building Competition Results	301
New Meccano Models	298
Photography	276
Railway in a Garden	286
Railway News	280
Railway Working in Scandinavia	268
Spider on War Work	266
Stamp Collecting	305
Stamp Gossip	306
Story of Tin—II	282
Suggestions Section	296
With the "Hampdens" to Stavanger	272

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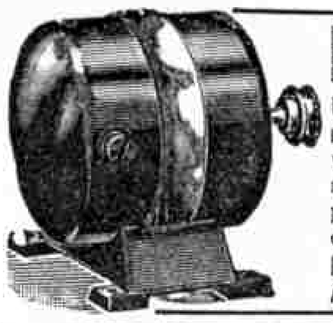

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Telegrams: "Meccano, Liverpool."

Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 6d. per copy. It will be mailed direct from this office, 4/- for six issues and 8/- for twelve issues.

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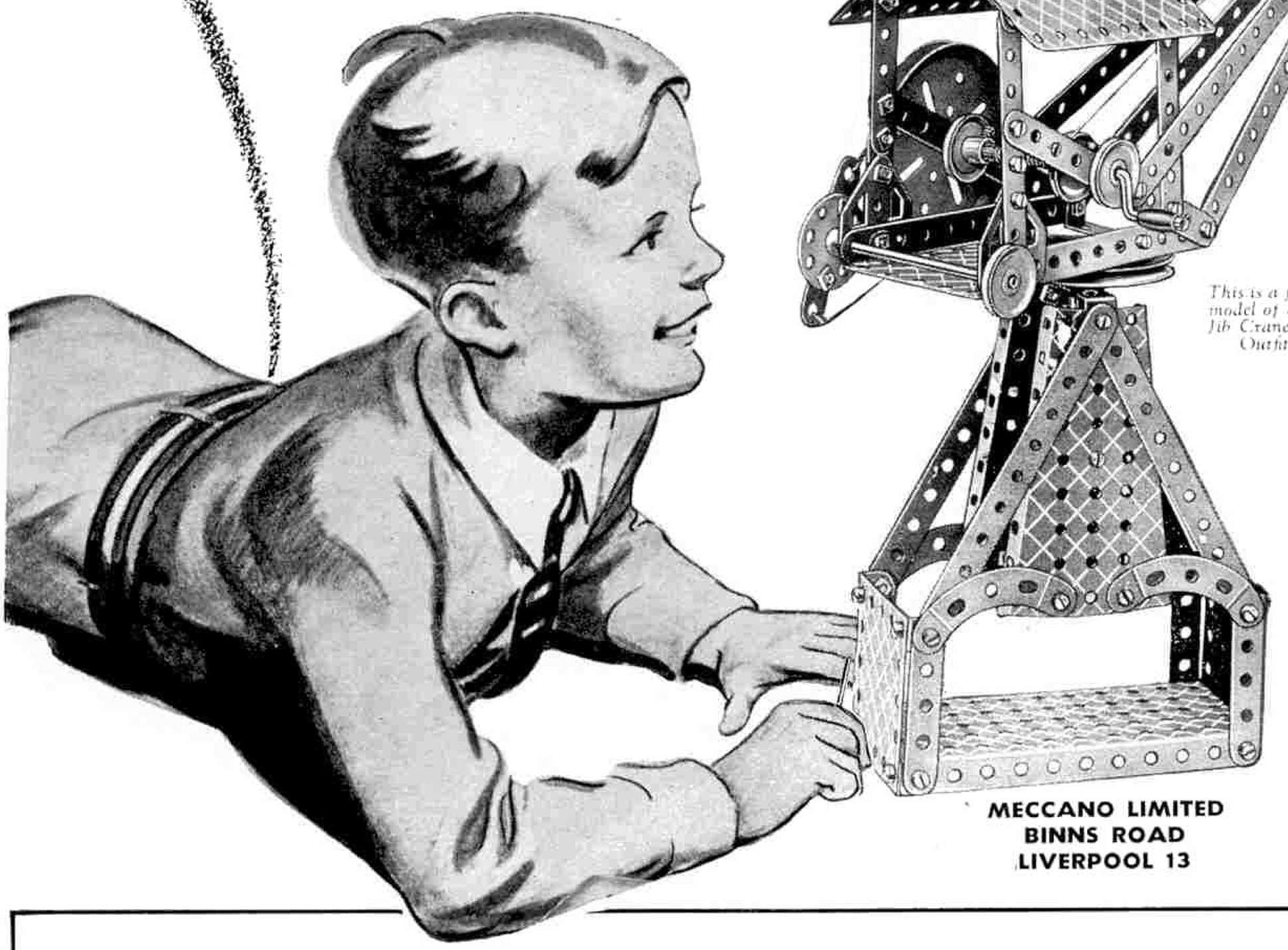

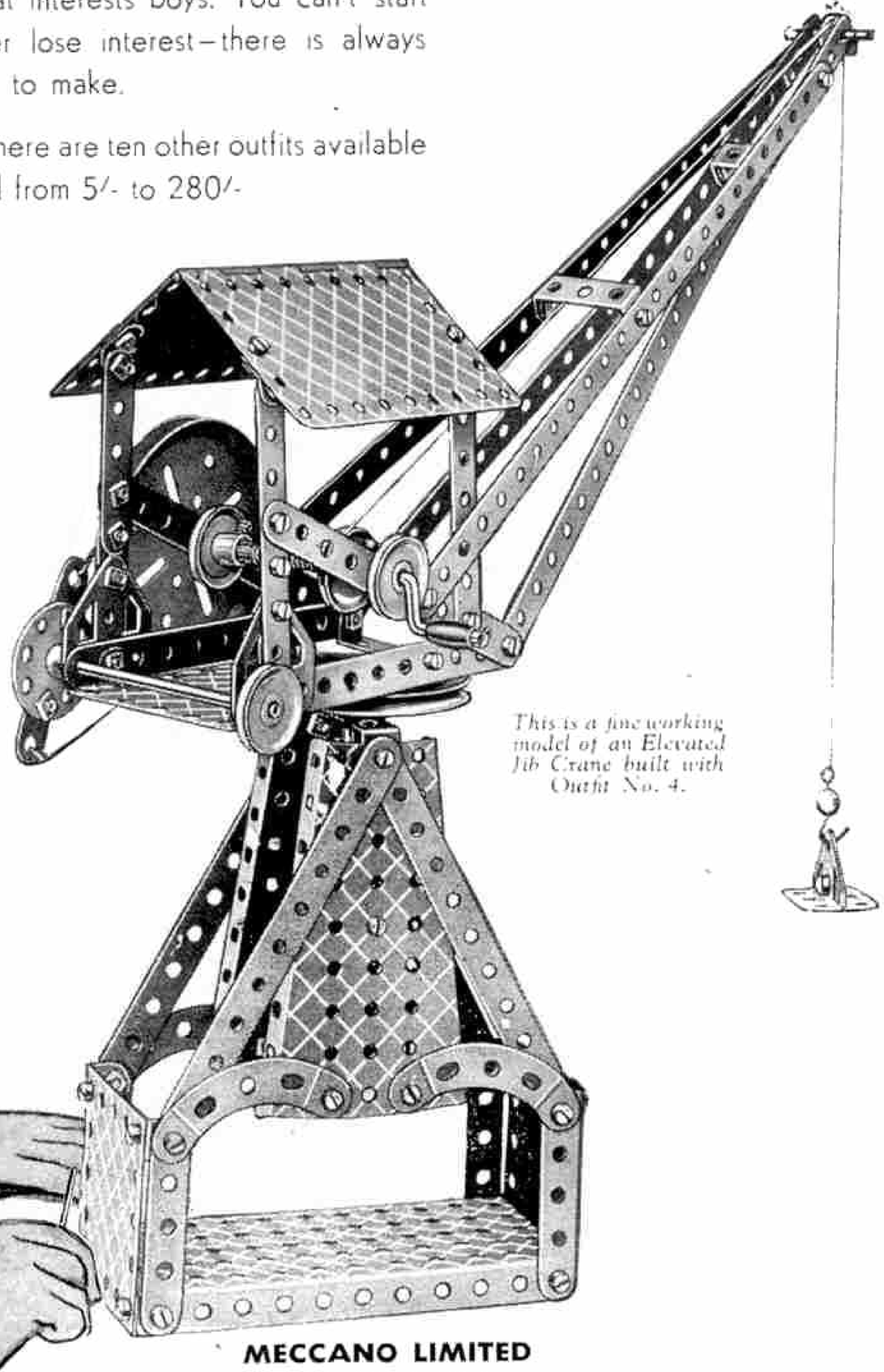

This is a fine working model of an Elevated Jib Crane built with Outfit No. 4.

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77/6

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67/6

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62/6

Hornby-Dublo Electric Tank Goods Train Set (L.M.S., L.N.E.R., G.W.R. or S.R.), for use with 12 volt accumulator.

52/6

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